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MOTOR AGE

VOLUME XXII

CHICAGO, DECEMBER 12, 1912

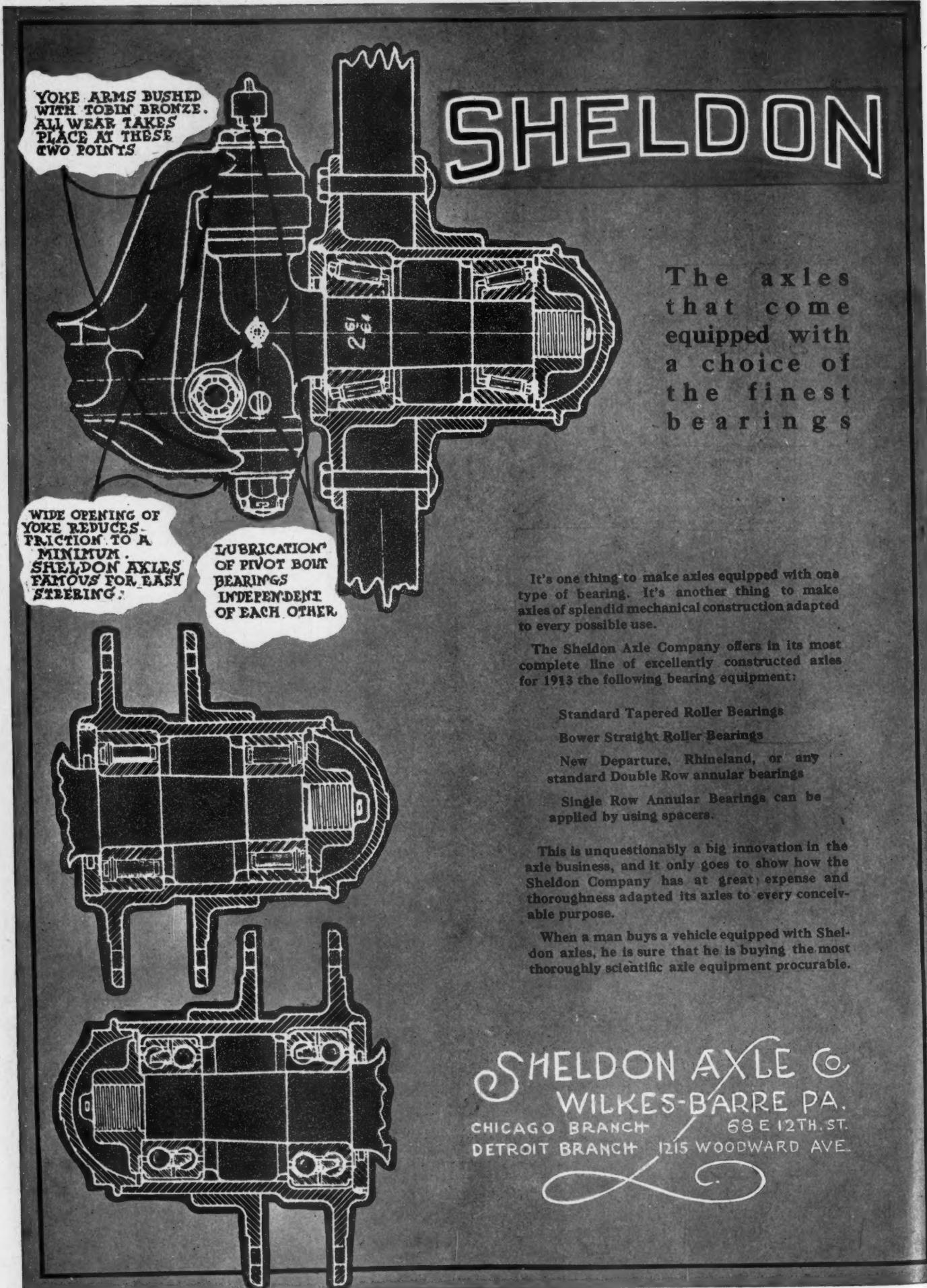
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MOTOR AGE
Published by the
CLASS JOURNAL COMPANY
910 South Michigan Avenue
CHICAGO ILLINOIS

Volume XXII

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Contents

SPRING ALL THE TIME IN JAMAICA.....	5
Motor attractions of Caribbean island—Ideal spot for touring in mid-winter	
DETROIT S. A. E. DISCUSSES SLIDE-VALVE MOTOR.....	10
L. B. Brown explains details of construction of Fischer's non-poppet engine—Magnetic-absorption dynamometer	
BIG CROPS IN TEXAS MEAN PROSPERITY FOR DEALERS.....	11
Farmers are flush with cash and car agents are behind in orders	
EDITORIAL—THE ACCESSORY AGE—YOU PAY THE BILLS.....	12
MASSACHUSETTS TAKES ITS MOTOR CENSUS.....	13
Bay state makes comparisons between 1912 and 1913	
ON THE MINOR CIRCUIT.....	14
Milwaukee forms new corporation to promote its annual show—Baltimore selects dates	
PARIS SALON OPENS.....	15
French exposition declared to be greatest of its kind—Many long-stroke motors shown	
MEET AND TALK ROADS IN CINCINNATI.....	16
Delegates to congress stirred to enthusiasm over outlook for next year	
CANADIANS BLAZE ATLANTIC-PACIFIC TRAIL.....	17
Motor journey from coast to coast takes 49 days	
UNITED MOTORS READY TO MOVE TO DETROIT.....	18
Transfer to be made after judicial sale is consummated	
S. A. E. ANNOUNCES ITS WINTER PROGRAM.....	19
Many reports to be heard and interesting papers read	
ONE THOUSAND MILES THROUGH COLORADO.....	20
Trip through Arkansas valley illustrated	
CALIFORNIA'S NOVEL ROAD READY FOR USE.....	26
Big barbecue celebrates completion of Rincon pass causeway	
THE EDWARDS-KNIGHT	28
Description of new car brought out for 1913	

DEPARTMENTS

Coming Motor Events.....	13	Realm of Commercial Car.....	38
Routes and Touring Information		From the Four Winds.....	42
Department	22	Among Makers and Dealers...	44
Readers' Clearing House.....	32	Development Briefs	46
Motor Car Repair Shop.....	36	Brief Business Announcements.	48
Current Motor Patents.....	37	Motorists' Kindergarten	48c



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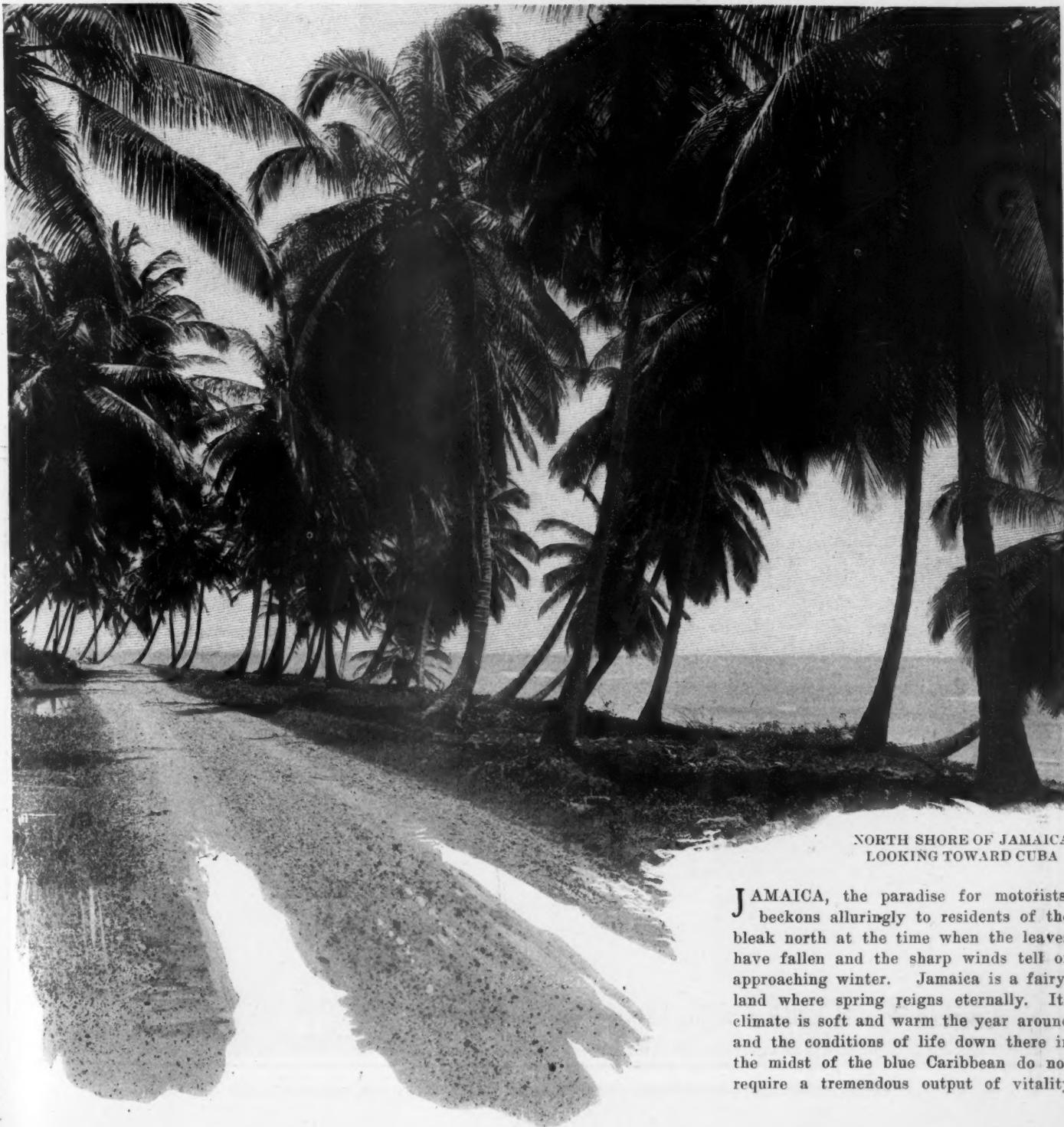
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Manufacturers of Automobile Lamps, Dynamos and Electric Starters.

MOTOR AGE

Spring All the Time in Jamaica

Motor Attractions of Caribbean Island



NORTH SHORE OF JAMAICA
LOOKING TOWARD CUBA

JAMAICA, the paradise for motorists, beckons alluringly to residents of the bleak north at the time when the leaves have fallen and the sharp winds tell of approaching winter. Jamaica is a fairy-land where spring reigns eternally. Its climate is soft and warm the year around and the conditions of life down there in the midst of the blue Caribbean do not require a tremendous output of vitality.

in order for men to simply exist. The island has an adequate system of hotels; the British colonial government has enacted liberal laws as applied to visiting aliens and, best of all, the roads of the island, almost 2,500 miles of them, are as nearly perfect in construction and scenic settings as any in the world.

Jamaica Easy to Reach

Jamaica is not out of the bounds of civilization. The port of Kingston is reached from New York in 6 days of sailing by six steamers each month. The rates are not high, either for personal passage or the transportation of motor cars, and the ocean trip may be reckoned among the attractions of such a tour.

The American visitor embarks for the voyage at New York, complying with the

ordinary regulations as to the shipment of his car. One line of ships has a regular weekly schedule and another dispatches two steamers each month. The car should be crated in the usual way and protected from the possibility of damage through the rolling of the ship. The best time to make a start is about the first of the year, although the season for Jamaica vacations is from November to May.

Custom Regulations

Taking the probable incidents of a tour that would occupy 2 months in the order of their chronology, the tourist will find first the customs regulations at Kingston. The tariff of Jamaica provides for duties on all imports, except where specifically noted, at the rate of 16% per cent ad valorem. In the case of the motorists, the exceptions for their benefit in the law are as follows:

Supposing the car is valued at \$5,000, the regular import duty would be \$833.33.



THE ROADSIDE SCENERY ALONG THE BOG WALK IS ROUGH BUT CHARMING



NEAR MANDEVILLE, JUST BEYOND POINT WHERE RAILROAD ENDS ITS MOUNTAIN CLIMBING

Under the law, if 30 per cent of this amount is deposited with the customs officers, or \$250, the car may remain in Jamaica for 2 months from the time of entry without any charge whatever if at the expiration of that period or before, it is shipped away.

Taxes Suspended for 6 Weeks

It may be used on the roads tax-free for 6 weeks. In case the party decides to remain longer than 2 months, the customs authorities charge 5 per cent of the regular duty for each month the car remains after 2 months have passed, up to the limit of the deposit, or 6 months additional to the exempt period. After that time, or if the car should be sold in the meantime, the full duty becomes due.

Personally, the American visitors are allowed to bring in, duty-free, personal belongings not to exceed the value of \$100 each. Of course there are some specific exceptions, the details of which may be learned at the customs house at Kingston,

but for all practical purposes it should be remembered that the free limit of importation is \$100 for Americans.

The money of Jamaica is British, although American currency is taken pretty generally throughout the island. It will prove a distinct saving to tourists to exchange their American money at Kingston for British gold, as the exchange basis out on the island is reckoned at 4 shillings for \$1.

Location of Island

Geographically, the island lies 100 miles south of the eastern end of Cuba. It is about 140 miles in extreme length by 40 miles across at the widest diameter. In shape it is an ellipsoid. Through the central portion of the island a spinelike mountain range towers into the cloudless sky, approaching the south shore at certain places and ending in huge peaks and bluffs at the east and west ends of the island.

The general topography of the country is rough and marked with series after



ANOTHER VIEW OF THE BOG WALK, SHOWING RECENT APPLICATION OF BROKEN ROCK



ENTERING THE CELEBRATED BOG WALK ROAD NORTH OF SPANISH TOWN

series of nearly parallel ravines ranging from the interior to the sea. Approaching the island, they give the impression of crinkled paper that is characteristic of many volcanic islands in the tropics. The island lies in 18 degrees orth latitude, but its tropical location is much ameliorated by the brisk sea breeze that blows during the part of the day when the sun's rays are hottest. This breeze is known locally as "the doctor," because of its health-giving coolness.

Kingston on South Side

Kingston, the capital and chief port of the island, is located on the south side of the island, about 40 miles from its eastern end. It is the seat of the colonial government and has a population of nearly 70,000, 90 per cent of which is black or colored. It was founded after the destruction of Port Royal by earthquake in 1692 and grew gradually until within comparatively recent years. The city was practically destroyed in 1907 by an earthquake, but since then it has been rebuilt on lines that render it earthquake-proof. Port Antonio on the north shore has an excellent harbor and there are numerous sizeable places all around the coast line.

Road-building is not a recently discovered and developed art in Jamaica. The highways date back many years before the day of the motor car, although it must be said that since its advent the progress has been very rapid. According to the latest official reports, the highway system of Jamaica includes about 2,500 miles of government-made and maintained roads.

NATIVE WOMEN WHO WORK ON THE ROADS



There is not a spot on the island that can not be approached by a main stone road, ranging all the way from a broad boulevard to a winding lane over which the palms and bamboos arch like the nave of a cathedral.

One of the favorite trips for visiting motorists is a complete circumnavigation of the island from Kingston and proceeding in either direction until Kingston appears in the distance once more. This trip may be accomplished in 5 days or 5 weeks, according to the desires of the tourists. The Caribbean sea is in view practically two-thirds of the time and even when the road runs inland and mounts the sides of the central range, the dimpling ocean of the Spanish main often can be sighted through the tropical verdure.

There are innumerable side trips into the interior that will repay their making and at least a dozen crossings of the island that may be made with pleasure and variation of scenery.

The climate, scenery and roads are the three most important attractions of Jamaica to the motor tourist. The climate and scenery are natural, but the roads are highly artificial.

Such highways as those of Jamaica would be impossible in any land where there is a season of frost. Consequently the original cost of building very excellent roads that stand up for years under mixed traffic is moderate and the cost of maintenance is minimized. In fact, practically all the repair work is done by negro women.

The main highways, particularly those adjacent to the cities, are as wide as the average highway anywhere, but out in the country the roads are narrow and in some places closely hemmed in by tropical vegetation. As a general rule they are made of broken stone upon which a smooth surface is laid without the use of a binder. The tropical climate has the effect of amalgamating the various elements used in the construction and the result is a smooth surface that carries the traffic with ease.

The chief deteriorating influence is the traffic itself, although the rainy season which is usually at its height in October, causes more or less erosion.

The unimportant character of the repair work may be judged from the fact that the current road-building and maintenance fund for the whole system, including 50 miles of new construction, is only \$750,000.

All Roads Included

If the new building costs \$50,000, the per mile cost of maintenance would be only \$280 a mile per annum. Similar service in the United States is over \$600 for anything like the same results. The remarkable thing about the Jamaican appropriation is that it is universal and that all the public roads on the island are included in its scope.

Despite the excellent road surfaces common in the island highways, the Jamaicans have provided against high speed in a peculiarly effective way. In the first place the roads are used commonly as walks by the natives and in order to insure their safety the law is stringent as to recklessness in driving. In the second place water-breakers are frequent in the hills. These may be traversed without discomfort at moderate speeds but become very destructive if the limit of prudence is passed. Anyway, nobody would want to go very fast on a leisurely tour of the garden spot of the world.

There are about 200 cars owned in Jamaica, most of which are of American manufacture. The inclosed body is distinctly out of place in the tropics, and consequently there is a dearth of limousines in Kingston and elsewhere on the island. Every car should be equipped with a top unless one fancies taking the chance of running into a tropical deluge. Light



SCENIC VIEW OF A JAMAICA CANYON, RIVER AND ROAD

waterproofs should be carried on all trips.

In 1911 something like forty motor touring parties shipped cars into Jamaica, showing an increase in this variety of touring of 100 per cent as compared with the season of 1910. During the coming season it is expected that the motor touring parties will number in excess of 100. The sale of cars has shown a large increase each year since 1905, the bulk of the early business being confined to foreign cars. Roadsters of about 30-horsepower rating are favorites with the residents, but the touring car with five or seven-passenger capacity is most common.

Many Gasoline Stations

Fuel, oil and incidental accessories can be obtained at several places on the island. The gasoline stations are located at Kingston, Bowden, Port Antonio, Port Maria, St. Ann's Bay, Falmouth, Montego Bay, Savannah-la-Mar, Spanish Town, and at various other places along the main roads. Complete garages will be found at Port Antonio and Kingston and any ordinary repair work can be done at almost any settlement.

As a sort of ground work suggestion to the tourist who contemplates making a trip to Jamaica, the following description of some of the features of a tour around the island is given:

Taking Kingston as a base the party may circle the island, following the south shore to the west. The first objective point is Spanish Town, about 12 miles distant to the west. This ancient place is full of interest. It is located on the Rio Cobre, and a few miles up the valley from Spanish Town is the celebrated Bog walk that has been known for centuries as one of the most beautiful roads in the world. The English corruption of the Spanish name of this road is hardly descriptive of it. The name is Boca del Agua, meaning the mouth of the water, and for over a century it has been called Bog walk, although there is no bog to be seen and the walk part of the name stands for



RUGGED SCENE IN BLUE MOUNTAINS, 28 MILES FROM PORT ANTONIO

about as perfect a carriage road as can be found anywhere.

There are numerous attractions otherwise in and around Spanish Town, and the swiftest schedule should allow for the spending of at least the remainder of the first day in prospecting around in the vicinity.

The second day's run may be to Mandeville, skirting the Blue mountains practically all the way. The mileage of the run is only a little over 47, and can be covered in 3 hours of easy running. It is much better to spend 6 hours as the route is through a marvelously interesting country. The course is generally through Old Harbor, May Pen, Colgate, Clarendon Park and Williamsfield to Mandeville. This may be extended almost any length by detours to the coast at Alley or up into the hills to any number of out-of-the-way points.

If the direct route is taken there will remain a half day to spend in and around Mandeville. This place is the center of the coffee and orange plantations of the island, and is so high in the Manchester hills that the railroad does not reach it. At that its elevation is only 2,200 feet, and the extreme grade of the motor road is only 6½ per cent.

Climate Is Salubrious

The climate of Mandeville is salubrious. On the coldest night the temperature never falls below 55 degrees and on the warmest day the thermometer has showed 85 degrees. At the height of the tourist season it will be well to arrange for accommodations in advance.

The third day's itinerary carries the tourists through Santa Cruz, passing along the foothills of the Santa Cruz mountains to Newmarket in the western forest coun-



MAP OF JAMAICA, SHOWING MOTOR TRIP AROUND THE ISLAND

try and thence north to Montpelier. This place is the center of the most extensive agricultural district in Jamaica, the Great River valley which extends in a gentle slope for 30 miles to Montego bay on the extreme northwest coast of the island. The direct route as outlined is about 58 miles long.

Run to Montego Bay

The fourth day may be spent in the run to Montego bay and thence along the north coast of Jamaica through Dry Harbor to St. Ann's bay. This is about 67 miles. The next day's run should be to Port Antonio, following the excellent road along the coast for 93 miles. The final run of the trip is from Port Antonio to Kingston by a variety of roads.

The foregoing is only the roughest sort of a suggestion and includes 237 miles. At a pinch it could be done in 2 days without

getting into the hands of the authorities. If only 6 days can be devoted to motoring on the island, the main features can be touched. But for a vacation trip of at least 1 month devoted to touring alone in Jamaica, something new and delightful can be found in every hour, providing the spirit of leisureliness obtains all the time.

Following the coast all the way around makes a trip of nearly 500 miles. There are twelve main roads across the island from north to south, and each will give a day of delight to the nature lover.

Special Rate for Motor Cars

There is a special rate on motor cars from New York to Kingston; the charges at the hotels are very reasonable in comparison with the accommodations and also in comparison with the same class of hotels in Cuba; for instance, gasoline is higher in price than it is in the United

States, but not emphatically so considering the importation.

To the motorist who wishes to avoid the weather of February and March in the northern part of the United States, it may be said that he could go much further or even stay at home and do worse than visit Jamaica.

There is little of attraction in Jamaica to the business man, as the chief pursuits of the people are stock raising and agriculture and all the actual labor is done by the dark-skinned residents. Therefore it is an ideal place for rest. The hotels at Kingston and Port Antonio are excellent.

To say the very least, the prospect of a week's sail over a summer sea going and returning and a month devoted to touring on the wonderful roads and amid the scenic beauties of Jamaica may well prove interesting.

Detroit Section of S.A.E. Discusses New Slide-Valve Motor

L. B. Brown Explains Details of Swiss Non-Poppet Engine

DETROIT, Mich., Dec. 6—At the regular monthly meeting of the Detroit section of the Society of Automobile Engineers last night, at which sixty-eight were present, a paper by L. B. Brown and descriptive of a new Swiss slide-valve motor was presented. It was productive of considerable discussion. Ferdinand Jehle also read a short paper on a new form of magnetic-absorption dynamometer.

The new Swiss motor, which was brought to this country by Mr. Brown and George Ratcliffe, London, Eng., was designed by Martin Fischer, of Zurich, Switzerland. The Motor and Gear Improvement Co. has undertaken its promotion in this country, and has it in an imported machine which is also built by Mr. Fischer.

Engine Has Seen Service

This particular engine has been put through some 11,000 miles of hard service, and from this experience Brown and Ratcliffe stated to the Detroit section that they could give the information obtained by this actual road use of the engine as well as results of a dynamometer test which was conducted on the Hudson Motor Car Co.'s testing block. Mr. Lewis' paper says in part:

The data obtained through Mr. Coffin and his associate engineers in the experimental laboratories of the Hudson company we lay before you. We shall confine ourselves solely to the description of the motor and data relating to it, and leave the matter of comparison entirely to yourselves.

The motor is a four-cylinder monoblock type, with a bore and stroke of $3\frac{1}{2}$ by $4\frac{3}{4}$ inches, or to be exact 85 by 120 millimeters, having thermo-syphon cooling, splash and forced feed lubrication, with ordinary high-tension ignition. To this extent the motor is entirely conventional. The special features which make it interesting as compared with other motors are its valve mechanism and its small clearance volume. The cylinders have semi-spherical shaped heads with cylindrical extensions passing through the waterjacket into which the spark plugs are fitted. This construction places the spark plugs in the ideal position and provides convenient means for attaching the waterjacket cover.

By reference to the vertical sectional cut of the motor, you will notice that these cylinders are fitted with two crescent-shaped valve slides, which form a part of the cylinder wall, each one taking up about 69 degrees of the

circumference. These slides are mounted on opposite sides of the cylinder. The slides, which are of cast iron, extend the entire length of the cylinder and about 2 inches below it, having at their lower extremity slots for the engagement of the actuating mechanism. Near the upper extremities rectangular openings are provided which register over ports of the same size in the walls of the cylinder. The slides are actuated by box cams, the shafts of which are driven by Coventry silent chains from the crankshaft, so that the movement of the slides is positive in both directions, entirely dispensing with the use of springs and insuring silent action. The travel of the slides is 1 inch, while the height of the ports is $\frac{3}{8}$ inch, giving a lap of $\frac{1}{8}$ inch.

While the actuating mechanism is somewhat similar to that of the Knight engine, inasmuch as the movement is positive in both directions, the use of box cams instead of eccentrics gives the same cycle as the poppet-valve type, with the characteristic long dwell after the closing of the ports, so that the slides are at rest during the compression and power strokes.

The cylinder heads are removable, having the conventional flange construction for bolting to the cylinders. In addition to the cylindrical extensions to accommodate the spark plugs which are on top of the heads, there also are extensions which project downward into the cylinders, these acting as bull-rings or guides for the valve slides, being intended to hold the latter on their seats. Cored passages connect the cylinder ports to the flanged openings to which the inlet and exhaust manifolds are attached.

In our early experience with this engine, we were at a loss to account for its high power, having in mind its small dimensions, and a great deal of speculation on this point failed to evolve any tangible explanation until the engine was brought here to Detroit, where dynamometer tests and a more thorough examination disclosed certain facts which indicate that in addition to the structural difference existing between this engine and the more conventional types, there are differences in the thermal conditions which make the motor unique. It is doubtless to these features that the relatively high power must be attributed.

The clearance is about 18 per cent of the total cylinder volume, giving a compression which is higher than that in use in general practice. It would seem that this high compression would cause spontaneous combustion, and while we have certain reasons of our own to account for the fact that this does not take place, it is hoped that a discussion on this point will either confirm our reasoning or evolve others. It is relevant to state here that during the several months in which the engine has been under our observation there has been no instance of spontaneous ignition or of overheating.

Another feature which must have a marked effect on the thermal efficiency is the small surface exposed to the combustion temperature. It will be noticed that with the exception of

the bull ring, every bit of metal is in close proximity to the cooling water.

Reference to the brake horsepower curve shows that the power increases steadily up to 2,000 revolutions per minute and that it is in direct proportion to the speed up to 1,500 revolutions per minute. You are familiar with the characteristics of brake horsepower curves of poppet-valve types, and perhaps will be interested in comparing these with the curve of the Fischer engine. Comparison with the M. E. P. curve will also be interesting and you will note that the peak in the curve shown is reached at 1,400 revolutions per minute and that it is in excess of 105 pounds throughout the entire range of speed.

Questions Asked and Answered

Mr. Ratcliffe, who collaborated with Mr. Brown in the preparation of the paper and who has had more to do with the operation of this engine than anyone in this country, answered the many questions which were brought up in the discussion of the paper which followed.

It was asked what the reasons for the lack of pre-ignition are, Mr. Ratcliffe answering that the only reason is on account of the perfectly shaped combustion chamber and efficient cooling. It was brought out that the timing is as follows:

Inlet opens 11 degrees after upper dead center.

Inlet closes 71 degrees after upper dead center.

Exhaust opens 63 degrees after lower dead center.

Exhaust closes 19 $\frac{1}{4}$ degrees after upper dead center.

This timing is not standard, as the inlet and exhaust overlap about 8 degrees and it was thought that increased power should be the result.

E. R. Fried brought up the question of cylinder wall expansion, stating that in his opinion it would be uneven, due to the fact that the wall is exposed to the cooling for about 220 degrees, while the rest of the circumference is covered by the valve. Mr. Fried further stated that the sleeves also would not expand evenly.

To refute these statements, Mr. Ratcliffe cited the examination of the cylinders when the engine was recently taken down at the Hudson plant. The micrometer tests showed that the cylinders were out of true round only a negligible amount.

Several additional facts were brought out as follows:

Dwell on compression, 149 degrees.
Exhaust opening, 262 degrees.
Port area, .7 square inches.
Fly wheel diameter, 16 inches.
Port width, 1 $\frac{1}{8}$ inches.
Oil consumption, 1 pint to 160 miles.
Gasoline consumption, 20 miles per gallon.
Total loaded weight of car, 4,300 pounds.
Piston displacement, 12 per cent less than that of Ford engine.

The question of machining was discussed, and it was further pointed out that the lack of additional data was due to the short time which the promoters have had for this work. A long block test is soon to be conducted by the Automobile Club of France.

In presenting a short paper on Garland's magnetic absorption dynamometer Ferdinand Jehle spoke in part as follows:

The theory is: A copper disk is made to revolve in a variable magnetic field. This sets up currents in the revolving conductor which short-circuit themselves and generate heat. The

heat is carried away by the cooling water.

The whole machine is supported on two large ball bearings. The friction in these bearings is the only thing not recorded by the scales. The disk is supported by two ball bearings. One of them takes the radial load and the other keeps the disk from moving laterally, and thus keeps the distance between it and the pole pieces constant.

By properly determining the number of turns of wire in the coil, the size of air gap, between the disk and the pole pieces, the number of pole pieces, and the diameter of the disk, the torque can be made anything we please and its maximum can be put at any speed we may desire to have it. Of course this must be determined by the designer. It is immaterial which way the disk rotates, hence it can be used equally well for motors rotating in either direction.

This particular machine was designed to absorb 100 horsepower at 2,000 revolutions per minute and is no doubt the best for general motor testing. The torque curve of this machine was made to actually fit the torque of motor car motors. Figure III shows the torque as well as the maximum and minimum horsepower curves which the dynamometer can handle. An examination of these curves will show that the characteristic curves of motors will always fall well within these limits. Figure IV shows two torque curves, one or the other of which may always, as far as the writer knows, be expected of a dynamometer depending upon

the resistance of a fluid. Similar curves for the electric cradle type dynamometer were not available.

The instrument is provided with an arm measuring 15.756 inches. This makes the horsepower constant 1/4000. If desired, however, it is furnished with a scale reading directly in pounds at 1 foot radius. This is by far the best, since it greatly facilitates the computing of results.

The magnetic absorption dynamometer, outside of being used in the experimental departments for motor tests, is very well adapted for testing assembled machines. More and more the road test is giving way to a dynamometer test of the complete car. In some cases electric cradle dynamometers have been used very successfully for this purpose. The magnetic absorption dynamometer would handle this very well and require much less room than the electric. The maximum current required is 3 $\frac{1}{2}$ amperes, direct current, at 220 volts.

If a motor is to be used in a truck or if we expect to use it for climbing hills on high speed, it must be able to exert a torque of large magnitude at comparatively low speeds. It therefore is important that we study very carefully the operation of motors under full load at speeds from about 200 revolutions per minute to about 600 revolutions per minute. For this purpose we must have a suitable dynamometer. The magnetic type will handle this particular feature very nicely. Even the electric cradle type is not entirely satisfactory at very low speeds.

Big Crops in Texas Mean Prosperity for the Car Dealers

Farmers Flush With Cash and Agents Are Behind in Orders

of the crop season makes it certain that every effort will be made to conduct the marketing in a similar manner in the future.

While there was an effort made to organize a holding movement among farmers to bring the prices up to a minimum of 15 cents per pound it met with very little encouragement. Through the disposition of their product at good prices farmers not only have much more money than usual on hand but this condition also applies to the banks as is reflected in the showing of the deposits. Beneficial effects are also felt by the merchants and in all lines of industry in the state.

There is some complaint of the low price that was received for cotton-seed, but there is no remedy for this dissatisfaction feature of the cotton-growing industry. While charges have been made that the cotton-seed oil mills of Texas are in a trust and combine and that they have placed the price of seed very far below what it should be, investigations into these alleged unlawful acts on the part of state authorities have not supported the charges, it is said.

Possible Cotton Crop

It is a little early to talk about the probable acreage of cotton in Texas next year, but there promises to be a considerable increase over the acreage of 1912. This increase will be due largely to the opening up of new lands in western Texas for agricultural purposes. All of the western half of Texas is rapidly filling up with farmers, and instead of being a region that was only fit for cattle grazing purposes, as was formerly thought, it is beginning to produce enormous crops of cotton and a variety of other products.

In the so-called recognized cotton-growing belt of Texas the crop diversification idea has taken a strong hold among the farmers and this is bringing about some reduction of the cotton acreage year by year. It is found that instead of devoting the land exclusively to cotton farming it can be made much more profitable by growing a variety of other crops mixed with hog and other live stock and poultry raising. In south Texas, particularly along the gulf coast and in the lower Rio Grande valley, crop diversification is now a well established principle upon nearly all the farms.

Crop Prospects

Just now the principal growing crops are Bermuda onions and cabbages. There is a considerable increase in the onion acreage in the different districts of south Texas. The live stock industry of Texas is entering the winter season in excellent shape. Late and generous fall rains throughout the grazing territory placed the range in fine condition for carrying the cattle through the winter.

MINNEAPOLIS CLUB ELECTION

Minneapolis, Minn., Dec. 10—The annual election of the Automobile Club of Minneapolis resulted: President, H. J. Clark; vice-presidents, W. P. Devereux and T. N. Kenyon; secretary, G. Roy Hill; treasurer, J. H. Prior; trustees, H. J. Clark, A. W. Strong, W. S. MacCartney, G. K. Belden, W. E. Satterlee and George A. Rose.

IOWA WANTS A MILLION

Des Moines, Ia., Dec. 9—Iowa good roads enthusiasts will ask the coming session of the Iowa legislature for an appropriation of \$1,000,000 for good roads. This week petitions were mailed from Des Moines to every car dealer in the state to secure the names of signers to present to the legislature.

MOTOR AGE

Published Weekly by
THE CLASS JOURNAL COMPANY
910 SOUTH MICHIGAN AVENUE CHICAGO

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

NEW YORK OFFICE
239 West 39th Street

SUBSCRIPTION RATES
United States and Mexico
\$3.00 per Year
Other Countries including
Canada \$5.00

You Pay the Bills

ARE you keeping your motor truck constantly moving during the working hours of the day, or is it wasting 45 per cent of the day waiting in line to reach a loading platform, waiting in front of the dinner-saloon, or waiting at your loading platform to receive the packages which are being delayed because of your lax internal system of handling your commodities?

DO you know if the drivers of your trucks are overloading them to the extent of 50 per cent. or 100 per cent.?

DO you know that while some truck manufacturers advertise their machines as capable of carrying 50 per cent. and as high as 75 per cent overload, that the vehicles are like human beings: overload them and you prematurely wreck them.

DO you know if your trucks are being over-speeded when loaded or unloaded? In other words, have you a positive knowledge that your drivers are operating your vehicles at a pace in accordance with the speeds advocated by the National Association of Automobile Manufacturers and approved by many of the manufacturers?

DO you know if your drivers are selecting the smoothest routes over which to drive your trucks when loaded and unloaded? Or, in a word, have you co-operated with them in a study of street conditions, with a view of obtaining the greatest possible mileage from your tire equipment?

DO you know if your drivers are taking rational precautions to protect the tires by way of slowing up when crossing rough street car tracks, reducing speed on rough brick pavements, cutting down speed on worn-out asphalt streets, avoiding sharp rocks or street car track intersections where the rails are worn to fine edge? In a word, do you realize that it only calls for one serious offense in any of these respects to damage a solid rubber tire so that its period of usefulness is cut down 30 to 50 per cent.?

DO you know if your motor trucks are being inspected regularly by some efficient mechanic who is competent to judge if the motor is operating properly; if the gearset is in condition; and if the running-gear parts are intact; and who can discover the symptoms of pending troubles and so using the stitch-in-time method save you thousands of dollars per year in truck maintenance if you are operating a fleet of vehicles?

DO you know if your drivers and helpers are using the most expeditious methods of loading and unloading? Or are they consuming double the time that your business rivals' drivers require to load and unload?

If Not, You Pay the Bills

YOU may imagine that 5-year guarantees, that 7-year guarantees, and that guarantees for life are protecting you.

You are mistaken.

Your deeds are on your own shoulders.

The rational manufacturer's guarantee will protect you from poor material, and perhaps defective workmanship; but the control of your driver, the loss of time in loading and unloading, the selection of rough streets, overloading, over-speeding, cruelty to tires, lack of daily inspection, fall without the pale of such guarantees. They fall on your shoulders and you must pay the bills.

The Accessory Age

THIS is the accessory age. The car buyer wants a ready-to-run machine; that is, a machine equipped not only for fine weather but for wet weather, not only for dry roads but for muddy, slippery roads, not only for sections where speed is not a factor supervised by the police but where it is; in fact, this is a rational age in which the buyer wants the car equipped for all touring conditions and for all emergencies.

THE wise manufacturer has been the one quick to realize this. There have been several of such. Such manufacturers have, during the last year or so, sold their output largely on the accessory equipment. Some were quick to realize the landslide towards self-starters a year ago, and greatly facilitated the movement of a year's product by a stock equipment. Other makers, endeavoring to compete in the same field, were called upon to delay announcements until they, too, had equipped their cars to meet this latest demands of a fastidious public.

THREE are today a few makers who still do not fit self-starters. They hope to dispose of a product on its inherent features of motor, gearset and running gear design. This is a lofty purpose and should receive its reward. Nevertheless, it is a fact that a good self-starter is a potent selling factor because every time a car is started it must be cranked, unless the driver is fortunate enough to utilize the existing explosive mixture in a cylinder by the starting mechanism of the magneto.

THIS is a rational age. The car owner wants the least possible bother. He wants to avoid walking into the muddy street to crank the car if such is possible. He wants to avoid the possibility of a back-kick, and while it is an undisputed fact that a great many of the 1912 self-starters gave anything but 90 per cent. efficiency, it is nevertheless a fact that the public has had a taste of the value of self-starters and will not be satisfied until a 100 per cent. product is added. Those manufacturers, who see the situation otherwise, had better trim their sails in accordance with public demands, because where they are rational they are going to be the eventual winner.

NINETEEN-THIRTEEN is going to be the keystone in the full equipment arch. Scarcely a car is listed for next year without its full equipment with the possible exception of self-starters and electric lighting. The buyer wants the complete-equipped car. He wants to buy it ready to run. He wants to buy it in this condition because it is economy to him. It saves him much time, and possibly much money. The buyer purchasing the non-equipped car is confronted with a herculean task; top, windshield, speedometer, clock, anti-skid devices, headlights, etc., all stare him in the face. It calls for time to select which is best suited for his car; it calls for much more time to wait and have these fitted; and after they are fitted there is still the dominant feeling that the buyer looks to the car maker, the top maker, the windshield maker, the speedometer maker, the lamp maker, etc., for the ultimate satisfaction that he desires.

CONTRAST this with the mental equanimity of the buyer of the fully equipped car. He realizes that the work is done under the superintendence of the seller, probably the manufacturer. He has the assurance that this manufacturer has at least selected equipments well suited for the machine. He can look to the manufacturer to stand back of the equipment. This is mental economy, and a good one.

Massachusetts Takes Its Motor Census

BOSTON, Mass., Dec. 7—The Massachusetts highway commission closed its fiscal year November 30, and now it is possible to get some idea of the great increase in the motor industry here during 1912 as compared with 1911.

With nearly \$650,000 received by the commission from the motorists this year, and averaging up the value of taxes paid by owners to local municipalities as reaching about \$1,500,000, some of which of course must have been spent on roads, without including manufacturers' real estate taxes, etc., it shows that it would be possible from the motor industry alone in the Bay state to build at least 200 miles of state highway. This is nearly 25 per cent of the total mileage in the state now, a mileage that has been under construction for some 15 years. The gain in the number of cars shows a jump of more than 10,000, while the increase in fees represents something like \$140,000 more.

In 1911 there were 38,907 cars registered from which the commission got \$380,760, while this year 50,132 machines were put on the books for which \$492,482.50 was collected. This shows that the big revenue of course comes from the motor cars. The manufacturers and dealers helped to swell the fund, too, for last year, with only 870 of them, the state got \$24,849, while for 1912 the figures show a gain to 1,114, from which \$27,157.50 was secured. This does not include \$5,000 for additional number plates for dealers.

Next in importance in revenue comes the operators' licenses that brought in

Bay State Makes Comparisons Between 1912 and 1913

this year \$29,386, compared with \$22,122 in 1911. The renewals of licenses was good for \$16,127.50 this year, against \$12,672.50 last year. The chauffeurs poured in \$11,140 for licenses and \$7,063.50 for renewals, while a year ago the figures were \$8,366 and \$5,680.50 respectively.

Then there were the examinations that were good for \$14,036, while in 1911 \$12,274 was received. The increase averages about 25 per cent all along the line and the figures are worthy studying by anyone who has an idea that the motor industry has reached its top notch and that the sales are dropping off.

In looking over the figures it shows that the low-powered cars, coupled with the medium-powered ones, are the more numerous. Of course this is to be expected, for the prices of many cars are graded according to the power. It is somewhat of a coincidence to find that this year there were within a few hundred cars rating under 30 horsepower registered as there were of all classes a year ago. The cars under 20 horsepower getting the \$5 rate totaled 15,774. Those between 20 and 30 getting the \$10 rate numbered 22,265.

So of the 50,000 machines nearly 75 per cent figure in the lower and medium-powered classes. And it is this very thing

that stands as a barrier as against the raising of the fees as contemplated a year ago and which will be tried again this year, for the motorists who would pay the greater portion of course would be the owners of the smaller cars.

The chauffeurs, too, form no small portion of the community now that aid the state by handing over money. This year, with \$32,239.50 taken from them, and more than \$25,000 last year, it helps out a lot.

ALL THIS TO BE A SWEEPER

Paris, Nov. 27—There is no room for green hands in the motor street sweeping service of the city of Paris. The government driving license, delivered after a practical examination, is the least important of the requirements, for while it is considered necessary that the operator should be able to drive mechanical skill is considered of still greater importance.

In order to be admitted to the ranks of the motor street sweepers all applicants must successfully pass the following tests: Forge a small part, according to drawing supplied; solder; adjust and assemble various forged parts, bearings, pulleys, fly-wheels, cranks, shafts, transmissions, gearsets, ball-bearings, etc.; case hardening, brazing, soldering, the making of pipe joints for motor cars; complete dismounting of a gasoline motor, assembling same and tuning up; fitting various kinds of lubricators, also cooling systems by pump and thermo-syphon and with and without fan; fitting and regulating a carburetor for gasoline or benzol; fitting and regulating an ignition system by magneto or storage batteries; fitting and regulating a clutch; change certain parts in a gearset and a differential; assemble and regulate brakes and steering gear. Finally, the candidates must find the causes of a breakdown in a motor and remedy them and also show their ability to verify the condition of a machine before taking it out.

Arrangements have been made by the Paris municipality for the gradual displacement of all horse-drawn vehicles for street sweeping and watering.

MASSACHUSETTS' INCREASE IN MOTOR CAR REGISTRATIONS

Comparative figures showing the increase in registrations and finances from the motor industry in the Bay State in 1912 over that of 1911:			
	1911	1912	1911
Motor cars.....	38,907	50,132	\$380,760
Motor cycles.....	3,685	5,034	9,640
Manufacturers-dealers.....	870	1,114	24,849
Operators' licenses.....	11,561	14,693	22,122
Chauffeurs' licenses.....	4,183	5,570	8,366
Operators' renewals.....	25,345	32,255	12,672.50
Chauffeurs' renewals.....	11,361	14,127	5,680.50
Examinations.....	6,137	7,018	12,274
Miscellaneous cash.....	3,663.95
Fines.....	26,744.50
Totals.....	\$645,344.44
	\$504,162.45		

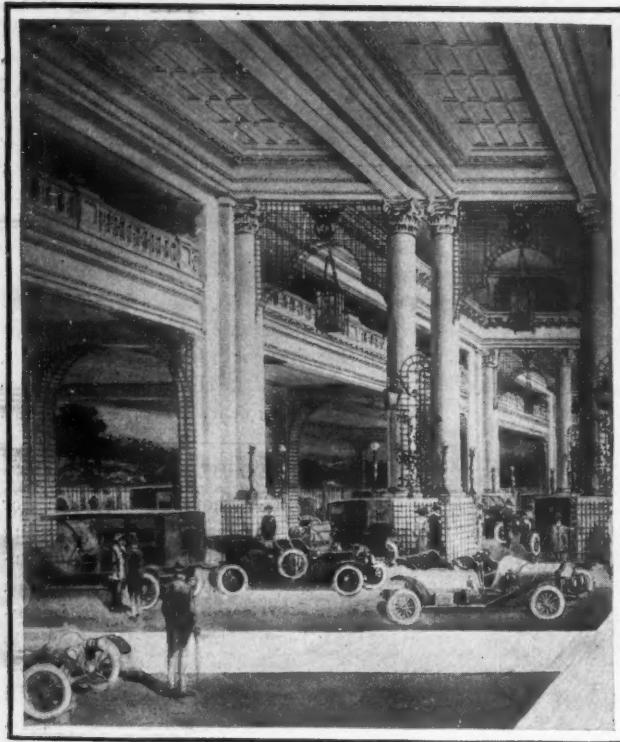
SHOWS

December 7-22—Paris salon.
December 16-21—Seattle, Wash.
January 2-10—Importers' Salon, Hotel Astor, New York.
January 4-11—Cleveland.
January 4-11—Montreal.
January 11-18—New York pleasure car show; Automobile Board of Trade; Madison Square Garden and Grand Central Palace.
January 11-18—Milwaukee, Wis.
January 11-22—Brussels, Belgium.
January 20-25—New York truck show; Automobile Board of Trade; Grand Central Palace and Madison Square Garden.
January 18-25—Philadelphia pleasure car show.
January 21-26—Toledo show.
January 25-February 1—St. Johns, N. B.
January 25-February 1—Providence, R. I.
January 25-February 1—Montreal, Canada.
January 27-February 1—Ottawa, Ont.
January 27-February 1—Scranton, Pa.

Coming Motor Events

January 27-February 1—Detroit.
January 27-February 1—Buffalo, N. Y.
January 27-February 1—Philadelphia truck show.
February 1-8—Chicago pleasure car show; National Association Automobile Manufacturers.
February 3-8—Washington, D. C.
February 10-15—Chicago truck show.
February 8-15—Hartford, Conn.
February 10-15—Minneapolis.

February 12-15—Geneva, N. Y.
February 15-22—Newark, N. J.
February 15-22—Albany, N. Y.
February 16-23—Richmond, Va.
February 17-22—Kansas City pleasure car show.
February 20-22—Canandaigua, N. Y.
February 24-March 1—St. Louis, Mo.
February 24-March 1—Memphis, Tenn.
February 24-March 1—Cincinnati, O.
February 24-March 1—Omaha, Neb.
February 24-27—Kansas City truck show.
February 26-March 1—Fort Dodge, Ia.
February 26-March 1—Glen Falls, N. Y.
March 1-8—Pittsburgh.
March 3-9—Des Moines, Ia.
March 8-15—Boston pleasure car show.
March 11-15—Des Moines truck show.
March 12-15—Ogdensburg, N. Y.
March 18-22—Syracuse, N. Y.
March 18-22—Truck show, Buffalo, N. Y.
March 19-26—Boston truck show.
March 20-24—New Orleans, La.
March 24-29—Indianapolis.



HOW GRAND CENTRAL PALACE WILL LOOK AT SHOW TIME

MILWAUKEE, Wis., Dec. 11—The fifth annual Milwaukee motor show, to be given in the Auditorium from January 11 to 17, inclusive, will be under the auspices of the Milwaukee Motor Show Association, a new corporation. Blank applications for space have just been issued. The show will open on Saturday night, January 11, at the same time that the national pleasure car show opens in New York, and will close on Friday evening, January 18.

The first two shows were conducted by the Milwaukee Automobile Club, which relinquished to the Milwaukee Automobile Dealers' Association in 1910. The M. A. D. A. gave the shows in 1910, 1911 and 1912. The new corporation is organized by members of the M. A. D. A.

The exhibit space this year has been enlarged to take in every inch of room provided by the mammoth Auditorium building, including the main arena, stage, rest rooms, balcony, thirty wardrobe compartments, Juneau, Kilborun, Plankington and Walker halls, the Fifth street lobby, the annex, the entire basement and part of the cafe, a total of 72,000 square feet of show space. Bart J. Ruddle will manage the show.

DETROIT ASSIGNS SPACE

Detroit, Mich., Dec. 9—Sixty firms drew for space at the twelfth annual show to be held at the Wayne Pavilion and Annex January 27 to February 1 next. Of this number forty-three will exhibit cars, while seventeen will show parts and sundries. The forty-three exhibitors of cars will show at least sixty lines of cars of different manufacturers.

It is a noteworthy fact that in spite of the material enlargement of the annex for the show of 1913 by the construction

of the building not only to cover the vacant lot back of the Wayne hotel but across Front street as well, giving 10,000 more square feet, there was not sufficient space to satisfy all.

SHOW GIVEN TO INDIVIDUAL

New Orleans, La., Dec. 11—After much discussion as to whether the dealers' association would handle all arrangements for the show or whether the management should be allowed to go to the person making the best proposition was decided by awarding the contract to T. C. Campbell. All decorations and allotments of space will be in his charge.

BALTIMORE SETS DATES

Baltimore, Md., Dec. 9—The Baltimore motor car show will be held this winter from February 18 to 22, inclusive. The show will be combined, the pleasure and commercial cars to be exhibited at the same time. The show will again be under the auspices of the Automobile Club of Maryland and the Baltimore Dealers' Association.

WINNIPEG ABANDONS SHOW

Winnipeg, Man., Dec. 7—The need of some large auditorium in the city of Winnipeg has again been demonstrated when at a meeting of the Motor Trades Association, held recently, it was decided that it would be impossible to hold a show in February next, on account of its having been found that suitable floor space could not be had.

WASHINGTON'S PLANS

Washington, D. C., Dec. 8—Plans for the motor car show scheduled for February 5-8 are progressing satisfactorily, despite the fact that sixteen of the leading dealers have declined to take part.

BOTH as a spectacle and as an exhibit of what is best in motor car and accessory manufacturing the show in Grand Central palace and Madison Square garden will eclipse any affair of its kind held in New York. On the walls of the main floor of Grand Central palace will be several Long Island scenes, a view of the magnificent Delaware water gap, views in the Berkshires, and paintings of scenes along the Hudson near West Point. On the mezzanine floor, western views will be found, including the Grand canyon of the Colorado, gorges and passes in the Rocky mountains, California vistas, sections of the cattle country and prairies. The balcony will be devoted to the sunny south and paintings of the beach at Ormond, Fla., where numerous world's speed records were made, Savannah and other Dixie points of interest will be depicted. These paintings will adorn the walls about the picturesque pergola setting in which the cars are to be shown. There will be much trellis work, flowers in profusion, and a general outdoor atmosphere in which the cars will show to advantage. On the main floor and mezzanine floors of the palace will be complete vehicles, while the balcony will house accessories, and motorcycles. The signs with the exhibitor's name at each booth, will be uniform—neat lettering of modest proportions being used to make the effect dignified and artistic. Similar arrangements are being made for the accessory floor.

On the Minor Circuit

Milwaukee Forms New Corporation to Promote Its Annual Show—Detroit and Baltimore Set Dates—Winnipeg Unable to Get Hall

Chairman T. Oliver Probey claims that more than one-half the space has been sold, it being understood that a number of outside concerns will take space in order to introduce their cars here and thus pick up an agent. A portion of the hall will be devoted to an exhibit of trucks. T. A. Garlock has been elected secretary of the show committee.

The opposition dealers, who are planning a carnival or opening week February 10-15, are going ahead with their arrangements.

FOREIGN CARS WILL BE SHOWN

Montreal, Quebec, Dec. 7—A feature of the Montreal motor car dealers' show, to be held January 25 to February 1, will be the extraordinary number of electric cars and trucks to be on exhibition at that time. Another feature of more than ordinary interest is the number of high-class foreign and English cars that will be on view at that time. Hitherto the average Canadian has had little opportunity of comparing the average American or Canadian car with the best type of foreign make.

Two hundred and fifty motor cars, 210 of the pleasure type and forty trucks will be on exhibition at the show to be held under the auspices of the Automobile Club of Canada during the week of January 4 to 11.

SETTLING ATLAS AFFAIRS

Indianapolis, Ind., Dec. 9—Fred C. Gardner, receiver for the Atlas Engine Works, has been authorized by the superior court to distribute the funds in his possession. In the final settlement the common and preferred stockholders will get nothing and the bondholders of a bond issue of \$1,050,000 will have to look to the prop-

MADISON Square garden will have a suitable setting for the products to be exhibited there. The show committee termed it the *Crystal palace*, because of the fact that many thousand square feet of mirrors are to be used on all sides of the building. By the use of the mirrors an effect of spaciousness will result. The complete scheme of decoration, however, for the garden has not been decided upon. The big girders of the building will not be covered by a big rug as was the case last year, but will have a more pleasing sky of blue material, soft and fluffy. The ornate lamp posts will again be used to mark off the exhibits. Lattice work will predominate in the structural treatment of the garden. Three mammoth crystal chandeliers and about thirty smaller ones of rich design will hang pendant from the dome, while along the railings and balconies garlands of flowers will hang in rich profusion. There will be a number of allegorical statues along the main floor which will front the pillars that support the elevated platform. As in the palace all the signs of the exhibitors will be uniform. A beautiful fountain will greet the visitor as he enters the garden. More than 200 tons of steel and 1,000,000 feet of lumber are to be used in reconstructing the garden interior. Two monster freight elevators will again be installed to hoist the cars to the galleries. When the show is on these will escape the notice of the visitors by an ingenious idea which will conceal them behind lattice work.

Paris Salon Now On

French Show Opens With 565 Exhibitors in Grand Palais—America Represented by Twelve Makes of Cars—France Has 200

Special Cablegram from W. F. Bradley

PARIS, Dec. 9.—The doors of the Grand Palais were thrown open to the public at 9 o'clock Saturday morning, admitting the public to the greatest and finest motor show France ever put on, the annual salon. There are 565 exhibitors in all and in the motor car section more than 200 different makes of French cars are displayed. There are thirty-four English makes, twelve American, nine German, eight Italian, and four Swiss. The exhibition covers 200,000 square feet of floor space. A lapse of 2 years has stimulated enthusiasm and an annual show is now assured.

Paris sprung a surprise on Olympia, the motors being all long-stroke. Not counting the Americans, there are 321 four-cylinder; twenty-six sixes; eleven two, and fifteen one two-cylinders listed. The smallest bore is 1.96 by 3.93 inches; the longest stroke 4.33 by 7.87. The range of motors is as follows: Seven motors, 2.36-inch bore; forty, 2.55; thirty-one, 2.75; sixty-two, 2.95; seventy-two, 3.14; eighteen, 3.34; fifty, 3.54; seven, 3.70; thirty-eight, 3.93, and thirty-seven between 3.93 and 5.51-inch bore; thirty-three motors have 2 to 1 stroke-bore ratio; about 50 per cent has 1½ to 1 stroke-bore; the balance are scattered, but none square. Besides the Knight, the show presents six types of sleeve and slide valve motors. The representative makers generally do not look with favor on any but Knight motors. The small poppet-valve motors are well made, economical with fuel and silent acting. The war scare puts a damper on the purchasing.

In comparison, the Paris salon is smaller than the Olympia show, which had more than 700 exhibitors, of which 353 were in the car section alone. Olympia also set up an attendance record that is going to be hard to beat, the returns from the English affair showing 255,112 for the session as against 226,095 in 1911 and 218,908 in 1910.

erty, which is now owned by the Lyons-Atlas company, for their money.

The receiver has about \$84,000, of which \$20,550.92 will be used in paying the receiver and his attorneys. The balance, \$63,459.89, will go to the merchandise creditors. The Lyons-Atlas Co., in keeping with the terms under which it acquired the property, has paid \$31,500 interest due on a bond issue of \$1,050,000, \$6,500 judgments against the Atlas company, paid a debt of \$105,000 secured by a bond issue and has paid debts secured by pledges of Atlas accounts amounting to \$48,187.04.

RECEIVER FOR LION NAMED

Detroit, Mich., Dec. 7—A voluntary petition in bankruptcy was filed in the United States district court here on De-

ember 6 by the Lion Motor Car Co., Adrian, Mich., whose plant was destroyed by fire some time ago. C. L. Robertson, of Adrian, was named receiver by L. E. Joslyn, referee in bankruptcy, in the absence of Judge Tuttle. The concern's liabilities are given as \$108,894.05 and the assets as \$105,546.94, of which \$86,727.91 is given as merchandise.

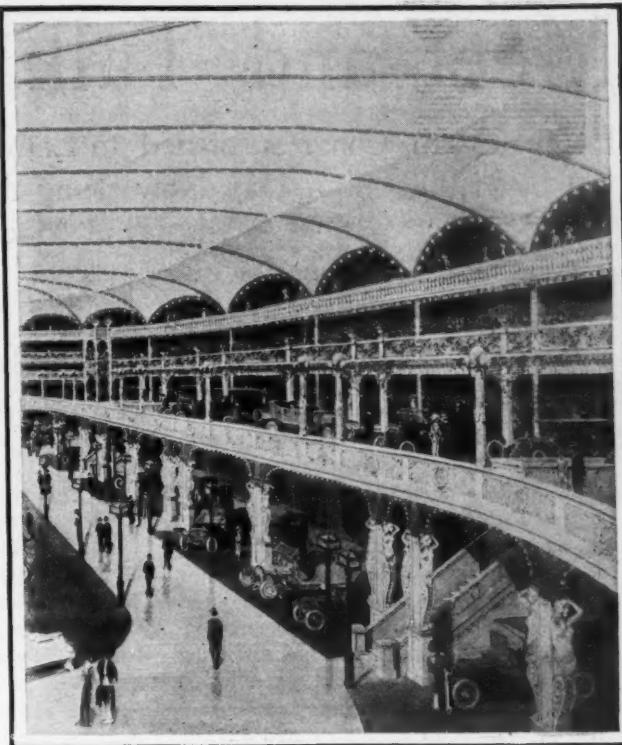
GOODYEAR'S ANNUAL REPORT

New York, Dec. 11—Net income of the Goodyear Tire and Rubber Co. for the year ending October 31, 1912, was \$3,001,294. Other profits, chiefly on rubber contracts, amounted to \$217,593, and the unappropriated surplus from previous operation is \$1,856,888. The year proved to be by far the greatest in the history of the

company and manufacturing operations were extended to such an extent that it was found to be advisable to increase the capitalization of the corporation. Hitherto the company has had a capitalization of \$6,000,000, but during the past year this has been expanded to \$15,000,000. The new stock consists of \$4,000,000 of 7 per cent cumulative preferred and \$5,000,000 common.

During the year dividends of \$2,289,100 in common stock have been distributed and \$139,604 has been paid to preferred shareholders.

The balance sheet shows assets of \$13,818,214. The plant is listed at \$3,855,569; actual cash on hand or deposit, \$1,268,539; inventories, \$4,398,384.



DECORATION SCHEME FOR MADISON SQUARE GARDEN

Meet and Talk Roads at Cincinnati

Delegates to Congress Stirred to Enthusiasm Over Outlook for Next Year—More Than \$1,000,000 a Day Now Being Spent on American Highways—Comprehensive Display of Machinery Made at Convention

CINCINNATI, O., Dec. 11—The ninth annual convention of the American Road Builders' Association and the third American road congress came to a close here Friday afternoon.

There were no prominent motor car manufacturers to take part in the events, but much transpired that is of importance to the motor car maker and user as well. They undoubtedly will reap the best benefit. Many of the next legislatures will have before them bills to appropriate a world of money to improve the highways. James Marker, state highway commissioner of Ohio, will recommend a sweeping good roads program for next year, which will include a request that the legislature name \$1,760,000, to be distributed \$20,000 to each county in the state. The program provides that each county appropriate an equal amount, to be added to the state's gift. Assuming that his request will be carried out, he predicts an expenditure in road construction next year of not less than \$3,500,000, and possibly \$4,000,000, in the Buckeye boundaries.

The enormity of the good roads movement can be realized when it is considered that \$1,000,000 is spent in this country every day for improvements. This fact was brought out by Secretary E. L. Powers, who believes that while we are at present far behind Europe in the matter of good roads, our country will soon forge to the front.

There were 150 exhibits on the main floor of Music hall. Each state had some sort of a display, while there were special attractions produced by contractors and others. The exhibit of the state of Ohio took in 400 square feet. The Ohio State University, the University of Cincinnati, the city of Cincinnati and the United States office of public roads had special displays, interesting to the 1,000 or more delegates.

The convention was formally opened Monday morning. Nelson P. Lewis, of New York, chief engineer of the board of estimate and apportionment of that city, made the opening address. Congressman-elect Stanley Bowdle made the address of welcome in behalf of the state of Ohio. Mayor Hunt spoke for Cincinnati. Thomas Pogue, prosecuting attorney, spoke for the county, while Walter Draper extended a welcome on behalf of the chamber of commerce.

In his address President Lewis briefly confined himself to a study of road building from the standpoint of the engineer, the contractor and the civil administrator of highways. He concluded with:

"We are convinced that there is no one thing which will more effectually promote the comfort, happiness and prosperity of the American people, provided the work is intelligently planned, well done and honestly financed. Our aim is to do what we can to improve the character of the work to be done, and to encourage a wise use of the funds provided for the purpose."

William H. Connell, chief of the bureau of highways and street cleaning of Philadelphia, followed Mr. Lewis' address with three papers on "The Organization of a Highway Department." Delegates Spaulding of Wyoming and C. Gordon Reel, chairman of the New York highway commission, talked on "Help from Uncle Sam." An ocean-to-ocean highway is the dream of the far westerners, declared Mr. Spaulding.

"Graft and corruption, polities and the work of a certain class of men in putting into legislation authorized construction provisions which designate patented pavements and specific brands of material, to the exclusion of other materials equally as good, some sometimes better—these are some of the things the road contractors of America have been contending with for many years," embodied the substance of the address made by Hugh Murphy, public works contractor of Omaha, Neb., who spoke on "The Contractors' Point of View."

Among the foreign delegates was M. de Gulleghy, commissioner of roads of France, who has been deputized by his government to make a study of public highways in this country. Samuel Hill, of Seattle, Wash., a relative of James J. Hill, was one of the prominent delegates from the Northwest. General Jacob S. Coxey, who sprang into national prominence in 1894 as the commander of the hobo army of idle men which marched to Washington as a "human petition to congress," was an attendant, and was greatly interested in the congress.

ARIZONA READY TO WORK

PHOENIX, Ariz., Dec. 7—Soon after January 1 the work of building Arizona's state highway system will again be in full sway. Work has been practically suspended since last February, when the state administration took the reins of government, for the treasury was empty then. Taxes will be coming in by the first of the year and work can proceed without interruption.

Two surveying parties are now in the field, one in Graham county and the other

in Cochise. They are laying out sections of the state highway system. Portions of the system that were built while Arizona was still a territory are to be connected.

There is some dissatisfaction with the present road taxation law. This law levies an assessment of 25 cents on each \$100 valuation of property, but provides that 75 per cent of each county's contribution must be expended within its own borders, under the direction of its board of supervisors. The remaining 25 per cent is expended wherever the state engineer and board of control think it will do the most good. It is argued that the money is thus spread over too wide an area, that it will take too long to build a complete, connected system.

A strong sentiment in favor of issuing bonds to build the projected highway system exists in the state. At a recent meeting the associated boards of supervisors of Arizona recommended a bond issue of \$10,000,000. It is probable the legislature, at a special session early next year, will take action to submit the proposition to the people.

During 1912 some excellent road work has been done by the state's convicts. Governor George Hunt's honor system of setting convicts to work without guards is proving quite successful. The convicts are building a fine concrete bridge across Salt river, 8 miles east of Phoenix, which is almost completed. As soon as it is finished the gang will be taken down the Gila river to a point near Yuma, where another bridge is to be built. Convicts are also building a road through the Pinal mountains, from Ray to Globe, and another westward from Florence toward Phoenix. These roads are costing the state about one-fourth what they would cost if built by contract labor.

BOOSTING FOR MIDLAND TRAIL

DENVER, Colo., Dec. 7—All motor interests in Denver and several other Colorado cities are now centering in a vigorous campaign just launched by the Denver Motor Club and the Denver chamber of commerce to secure the establishment of the proposed Midland trail as the first official motor highway from coast to coast. Good roads promoters of Colorado and Utah have organized the Colorado-Utah Midland Trail Association, with headquarters at Grand Junction, Colo., and branches of the new organization are being formed in all the interested cities in both states.

The movement was given an impetus in this city a few evenings ago at a mass meeting where addresses were given by

Governor-elect Ammons and good roads enthusiasts from many parts of the state. All the other commercial, good roads and civic organizations of the city have been asked to appoint committees to co-operate in the fight to bring the first official transcontinental highway through Denver, Grand Junction and Salt Lake City. Other towns joining the movement are Golden, Idaho Springs, Sulphur Springs, Kremmling, Wolcott, Glenwood Springs, Rife and Mack, Colo., and Green River, Price and Provo, Utah.

The proposed new route extends from New York city to San Francisco, via Philadelphia, Pittsburgh, Columbus, Indianapolis, St. Louis, Kansas City, Topeka, Denver and Salt Lake City. It is reported to be some 200 miles shorter than any of the other three coast-to-coast routes marked out by Westgard during the last few years.

The Denver Motor Club and the Denver chamber of commerce are elated over a report just received from Carl G. Fisher of the Ocean-to-Ocean Highway Association, that the exploration and pleasure tour to be made from Indianapolis, Ind., to the Pacific coast next summer will be scheduled for a stop in Denver. The party will leave Indianapolis next July 4, and will include 100 or more cars and probably a number of army trucks.

This inspection tour, which will be conducted by the Indiana Automobile Manufacturers' Association, is looked forward to by local motorists and good roads promoters as destined to bring Colorado more and more before the public as a motor tourist state.

The Denver-Chicago sociability and advertising tour made last summer by ten Colorado cars was the first event to call the attention of the motoring public of other states very prominently to Colorado.

The trip made through Colorado's mountains a short time ago by John P. Dods, of the Automobile Blue Book Publishing Co., created a great deal of additional interest, and another valuable contribution has been made by the recent laying out of the Midland trail through Denver by A. L. Westgard, of the American Automobile Association.

The series of articles now running in Motor Age, entitled "One Thousand Miles Through Colorado," written by J. P. Dods, is calling forth a great deal of interest and appreciation in this section.

All these enterprises are accomplishing a great deal toward arousing a widespread and intelligent appreciation of the value of good roads to every community, whether urban or rural.

TEACHES HOOSIERS ROAD LESSON

South Bend, Ind., Dec. 10—Edward Hines, of Detroit, road commissioner of Wayne county, addressed a meeting of business men, manufacturers, professional men and farmers interested in the making of good roads, Saturday night. The meeting, which was arranged by the chamber of commerce, was preceded by a dinner for Mr. Hines and Paul D. Sargent, an assistant director of good roads for the United States government, arranged by the directors of the chamber.

Mr. Hines' talk was illustrated by motion pictures, showing the construction of the concrete type of roads which he has developed. The pictures showed the roads radiating from Detroit a few years ago in almost impassable condition; mud hub deep was no exception. The concrete roads which have been constructed to the extent of 125 miles on the various roads were shown in construction and completion.

The farmers are enabled to make their

trips to market in a fourth of the time formerly required, Mr. Hines declared, and in addition have the advantage of coal and ice delivery service and daily newspaper delivery by carriers on roller skates as in the city. The cost of road, according to Mr. Hines, is \$15 per square yard. Considering the durability and the excellent surface, with scarcely any dust, he declared the concrete road is most economical in the long run.

The first road in Wayne county of this type was built 4 years ago and there is not a rut or hole in the entire surface today, said Mr. Hines, who also declared he had ascertained this by a careful inspection trip. The construction and maintenance of the Wayne county roads under the Michigan law, which is largely the work of Mr. Hines and his associates, is entirely in the hands of three road commissioners who conduct the work winter and summer, on a strictly business basis. About 1,200 men are employed during the building season and in the winter many are at work making the concrete tiles which are used for drainage.

ANOTHER GOOD ROADS BODY

Davenport, Iowa, Dec. 7—Permanent organization of the Tri-City Ocean-to-Ocean Official Highway Association was effected at a meeting of good roads boosters of Davenport, Rock Island and Moline at the Rock Island club last week. This association will work for the improvement of roads in Scott county, Iowa, and Rock Island county, Illinois, and in addition, will endeavor to put the tri-cities on the line of the official Ocean-to-Ocean highway, which will carry tourists to the Panama exposition at San Francisco in 1915. Among the officers elected were: President, George W. Ross, East Moline, and secretary-treasurer, A. E. Nissen, Davenport.

Canadians Blaze a Trail from the Atlantic to the Pacific

Motor Journey from Coast to Coast Takes Forty-Nine Days

VANCOUVER, B. C., Dec. 10—Out of the haze of dreams, out of the realm of visions, the Canadian highway emerges, proved feasible on the first attempt at a transcontinental journey.

The tour officially started at Halifax and ended at Victoria on October 18, on the return from the west coast of Vancouver island, when a banquet was given to the pioneers by the president of the Automobile Association, A. E. Todd. The actual tour from coast to coast occupied 49 days' elapsed time. The actual running time was 41 days and the mileage was 3,900 miles, which gives an average of 95.13 miles per day.

Road conditions were bad owing to the immense rainfall in every part of the country. Many parts of the country, especially Manitoba, were turned into swamps and quagmires; this reduced the daily average considerably.

In addition to the 3,900 miles, 700 miles were covered under other than the car's

own power, owing to the absence of trail or road. This applies particularly to New Ontario. As far as North Bay no shipping had to be undertaken, although this was the first car that ever had come through all the way from Halifax to that point.

At first it was not difficult to keep up an average of 120 miles a day, but from the prairie provinces on this was reduced to as low as 60 miles. The highest daily run was made in Alberta, 184 miles, between Maple Creek and Lethbridge, the lowest in Manitoba, 114 miles, from Winnipeg to Headingley, owing to the wretched state of the gumbo roads. The car was running on average of 10 miles to the gallon; sometimes as much as 15 miles were made to the gallon, but in some parts of

British Columbia 5 miles to the gallon was good going. The number of broken links in the road through British Columbia necessitated running on the ties in some places and taking a steamer on Kootenay lake on another occasion. The cost of crossing from Halifax to Vancouver averaged about \$2.50 a day per person. The expenses of the car were about \$5 inclusive of repairs.

The gumbo roads of Manitoba were in such bad condition that the drivers went on strike in Winnipeg, causing a 3 days' delay. Owing to the absence of roads many detours had to be made, amounting to 600 miles altogether, of which 300 were in Ontario and 300 in British Columbia.

Scarcely any macadam roads were found on the journey. The majority were earth and the rest gravel. The best roads were in British Columbia and in Ontario, the worst in Manitoba. The earth roads of the maritime provinces and Alberta were of about equal merit.

United Motors Ready to Move to Detroit

NEW YORK, Dec. 11—Special telegram—Final preparations are being made for the removal of the United Motors headquarters from New York to Detroit. The date for the actual change is still unfixed, but it is generally believed that it will be accomplished very shortly after the judicial sale has been made and reorganization finished.

During the past week a series of meetings has been held at headquarters behind closed doors and the announcement has been made that the few remaining office employees of the company will resign within a short time. The removal of the company to Detroit places its administrative departments in close proximity to its manufacturing plants and foreshadows renewed manufacturing activity at the quiescent factories of the company in the Detroit zone.

The affairs of the United States Motor Co. await the judicial sale that has been decreed for January 8. In the meantime manufacturing activities are at a low ebb. Save for such industrial work as is necessary to maintain the supply of parts for the repair of existing cars, all the plants of the company are shut down except for the completion of the manufacturing schedules of 1912 and the continuance of the manufacturing schedules of the Maxwell-Briscoe Motor Co. for 1913 and its experimental work for 1914.

The Brush and Sampson plants are idle except for the production of spare parts; the Columbia is finishing the last of its regular schedule; Stoddard-Dayton has finished its schedule. The three Maxwell plants, chief of which is at Tarrytown, N. Y., have about completed schedule. The Newcastle plant is inactive for the time being and the Providence plant is quiescent. The Thomas plant is completely shut down except the repair department.

Under order of court the issuance of \$1,500,000 of receivers' certificates was authorized to commence the Maxwell manufacturing schedule for 1913 and much work has been done toward this end. So far the money used for the Maxwell program has come from other sources than the sale of the certificates.

Attorneys for the creditors state that upwards of 95 per cent of the total claims against the company have been filed, indicating an almost unanimous opinion in the minds of the creditors as to the feasibility of the reorganization plan.

The second call for 10 per cent of the assessment levied against the stock has been made, but details as to the exact amount of stock deposited are lacking. It is said that it totals more than a majority. No apprehension is felt among the various interested elements in New York with reference to the court action in bankruptcy in New Jersey. It is pointed out that the

Transfer to be Made When Judicial Sale Is Consummated

New York court has possession of the assets and that the indicated program of sale of the big holding corporation will be carried out.

At the meeting of the sales and district managers of the company, those who represented districts in which the branch houses have been liquidated resigned automatically and the remainder considered the future in executive session.

ALFRED REEVES MAKES CHANGE

New York, Dec. 10—Alfred Reeves, vice-president and sales manager of the United States Motor Co., and A. R. Gormully, general purchasing agent of the same corporation, have severed their connections with that company to engage in other work. Mr. Reeves has been elected vice-president and general manager of the Hartford Suspension Co., manufacturer of shock absorbers, electric starters and lighters and specialties.

Mr. Gormully has been elected treasurer of the Steinbock Engineering Co., which has been in course of development for about a year. It is announced that he probably will assume some more intimate connection with the industry in the near future.

NEW SWINEHART GENERAL MANAGER

Akron, O., Dec. 10—Clifford B. Myers has been appointed general manager of the Swinehart Tire and Rubber Co. to take the place of W. W. Wuchter, president of the company, who has acted as general manager. Mr. Myers has been identified with the Diamond Rubber Co., serving in the capacity as manager, for Ohio. It was announced today that the Swinehart company has plans under way for a material enlargement of the Akron plant. The present factory is in a business district in the city, and as it is practically impossible to buy more land there, it is probable that a new factory will be built in the suburbs.

MORE CHICAGO EXHIBITORS

Chicago, Dec. 10—More motor truck and wagon makers have contracted for space at the Chicago show during the past week. This brings the list of complete vehicle exhibitors up to sixty-nine—one more than in the New York show.

As all of the ground floor space in the Coliseum, annex and First Regiment armory has been allotted, it has been found necessary to set aside a large section of the second floor of the annex for the display of the lighter types of motor wagons.

This embraces all the space on the south half of the center aisle formerly devoted to motor cycles.

Among this year's exhibitors are sixteen companies that never have shown their product at Chicago. All but four of these are wholly new makers whose machines are just coming into the market for the first time. Eighteen of the Chicago exhibitors have made no arrangements to display in New York this winter. Most of these are mid-western makers, located principally in Chicago, and in other Illinois, Wisconsin, Michigan, Indiana and Ohio cities.

The week's additions to the list are as follows: Harder Fireproof Storage Warehouse Co., Chicago; Kentucky Wagon Mfg. Co., Louisville, Ky.; H. J. Koehler Sporting Goods Co., New York; Lansden Co., Newark, N. J.; Mais Motor Truck Co., Indianapolis, Ind.; Mercury Mfg. Co., Chicago; Mogul Motor Truck Co., Chicago; Stewart Motor Corporation, Buffalo, N. Y.; Ware Motor Vehicle Co., St. Paul, Minn.

The M. & P. Electric Car Co. and Transit Motor Truck Co. have dropped out and given up their spaces.

TARIFF REVISION HEARINGS SET

Washington, D. C., Dec. 10—Hearings on the revision of the tariff law will begin January 6 and continue thereafter every Monday, Wednesday and Friday until the various schedules are completed, according to a decision made by the Democratic members of the ways and means committee. One day will be devoted to each schedule, though if necessary in any case not exceeding 2 days will be allowed by the committee.

There are fourteen schedules to be considered. The schedules will be considered in their regular sequence in the present tariff law. The first hearing, on January 6, will be on schedule A, fixing the duties on chemicals, oils, etc. The metal schedule is expected to be reached about January 13, at which time it is expected the motor car and allied industries will be on hand to air their views.

OHIO'S PLANS FOR 1913

Findlay, O., Dec. 8—State Highway Commissioner James M. Marker has made his plans known in reference to road building in Ohio for 1913. He will request that the legislature appropriate \$1,700,000, which would give every one of the eighty-eight counties in the state \$20,000 each. This program will be with the understanding that each county votes a like amount for good roads. Mr. Marker says he will ask the legislature to provide for a $\frac{1}{2}$ mill levy on good roads construction during 1914. Under the present system of state aid each county receives \$5,000 each year.

S. A. E. Announces Its Winter Program

NEW YORK, Dec. 10—Details of the program to be followed at the annual meeting of the Society of Automobile Engineers are contained in the current issue of the bulletin published by that organization.

The sessions will be held at the new Hotel McAlpin and will commence January 16 at 9:30 o'clock in the morning with a business and professional meeting. There will be a professional session at 2 in the afternoon and the commercial vehicle will be the subject of discussion and consideration at the evening meeting.

Friday, January 15, will have professional sessions at 9:30 a. m. and 2 p. m. and in the evening the annual banquet will be held at the McAlpin. Saturday morning's professional session will close the convention.

Prior to the opening meeting the standards committee will assemble on Wednesday at the headquarters of the organization to receive the presentation of the reports of subdivisions that have met with the approval of the council. Among the papers and reports scheduled are the following:

Reports: Broaches, S. W. Spicer; ball and roller bearings, David Fergusson; frames, J. G. Perrin; miscellaneous, A. L. Riker; sheet metals, T. V. Buckwalter; motor testing, John O. Heinze. Nomenclature: springs, Harold L. Pope; truck standards, William P. Kennedy; wheel dimensions and fastenings for tires, William P. Kennedy, and aluminum and copper alloys, William H. Barr. All of the above are formal reports of divisions of the standards committee and will be presented by the various chairmen as noted.

Among the formal addresses scheduled are the following: "Effect of Relation of Bore to Stroke in Automobile Engines," John Wilkinson; "Stability of Automobile Propeller-Shafts," J. M. Thomas; "Methods of Brake Capacity Determination," S. I. Fekete; "Leaf Springs," L. J. Lane, and "Standardization of Drawings," George W. Dunham. Numerous other optional papers have been listed.

UNCLE SAM NOTES PROGRESS

Washington, D. C., Dec. 7—In his annual report to President Taft the secretary of agriculture calls attention to the fact that there probably never was a time in the history of the United States when the question of improved roads was under more serious consideration. The process of centralizing the control of highways has gone steadily on and each year sees an added number of states that have established state highway departments. There remain many perplexing questions in highway technique and in the plan of administration and finance for public highways.

Many Reports to Be Received and Interesting Papers Discussed

"The work of the office of public roads of this department," says Secretary Wilson, "fortunately has kept pace with the widespread demand for information and assistance in road matters. There have been built during the present fiscal year thirty-two object-lesson roads under the direction of the engineers from this office. Eight sections of experimental roadway were constructed at Chevy Chase, Md. These sections were built for the purpose of determining the relative merits of different forms of bituminous material used as binders and dust preventives on macadam roads. A careful traffic census has been taken each thirteenth day since the completion of the work. It is planned to keep accurate records of the cost of maintenance of the various sections and properly to relate such costs to the traffic sustained by the road."

MEETINGS DURING NEW YORK SHOW

New York, Dec. 9—Detailed schedule of the various meetings to be held during the coming show season by the Motor and Accessory Manufacturers has been announced as follows:

Tuesday, January 14, at 10 o'clock a. m.—Meeting of the executive committee at headquarters.

Tuesday, January 14, at 3 o'clock p. m.—Meeting of the board of directors at headquarters.

Wednesday, January 15, 5:30 o'clock p. m.—Tenth annual meeting at Waldorf-Astoria.

Wednesday, January 15, 8 o'clock p. m.—Fifth annual banquet at Waldorf-Astoria.

Thursday, January 16, 2:30 o'clock p. m.—Board of directors at headquarters.

TETZLAFF PROMOTING ROAD RACE

Santa Barbara, Cal., Dec. 7—Teddy Tetzlaff, the racing driver, and Bert Smith, motor editor of a Los Angeles paper, are at present promoting a road race to be run July 4, from Los Angeles to San Francisco. The two are trying to get the coast and valley routes to bid against each other.

Santa Barbara undoubtedly will help the valley. In other words, Santa Barbara does not want the road race to come this way. The matter was informally discussed at the meeting of the chamber of commerce and no voice was raised in the interest of the race because of the damage to the roads.

The plan of the promoters is to have the two sections of the state bid against each other. While here Tetzlaff said Bakersfield would offer \$5,000 to have the race come that way. Santa Barbara folk hope Bakersfield wins out. Rather than bid for the race they would give to insure the race going somewhere else.

The coast route would be the most advantageous. The Rincon sea-level road has shortened the distance 9 miles and pro-

vided an easier grade. But it is feared that half a hundred speeding cars would do much damage to the causeways and new paving, and at the same time set an example for others who might later wish to reduce the record. Santa Barbara has had some experience with record-breakers and is heartily tired of them.

RECEIVER FOR FLANDERS MFG. CO.

Detroit, Mich., Dec. 7—Following a meeting of the board of directors of the Flanders Mfg. Co. on December 4, at which plans for the continuing of the business were submitted by the creditors' committee, application was made on behalf of the Wagner Electric Mfg. Co., St. Louis, Mo., by S. T. Douglass, an attorney, of Detroit, before Judge Tuttle in the federal court in Bay City, Mich., on December 5, to have a receiver appointed for the Flanders concern. The Detroit Trust Co. was appointed, the bond being fixed at \$50,000.

According to a statement of the Flanders company's affairs which appeared in these columns, the concern's assets are greatly in excess of its liabilities, and its present financial distress is merely from the lack of ready capital. It is generally understood that the Pontiac plant is a money-making one, and that the straitened monetary condition is due to several other holdings. It is proposed to continue business in the event that the contemplated refinancing and production plans are agreeable to the receiver.

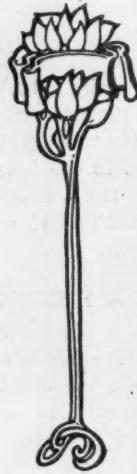
QUAKERS HOLD AN ELECTION

Philadelphia, Pa., Dec. 5—At the annual meeting and election of officers of the Quaker City Motor Club in the Hotel Walton on Tuesday night, the following were chosen to serve the ensuing year: President, Paul B. Huyette; first vice-president, C. Douglass Bartlett; second vice-president, I. T. Shoemaker; treasurer, Ralph L. Murray; secretary, A. E. Adams; board of governors, L. D. Berger, P. D. Folwell, Dr. L. L. Gaus, G. Hilton Gantert, George M. Graham, Frank Hardart, E. T. James and B. H. Kirkbride. With the exception of Dr. L. L. Gaus and B. H. Kirkbride, directors, and A. E. Adams, secretary, the personnel of the board is the same as last year.

TO MAKE TAIL-LAMP LIGHTER

Indianapolis, Ind., Dec. 10—The Auto Lamp and Number Co. has been organized and incorporated here with an authorized capitalization of \$3,000 to manufacture a combination illuminated registration number and tail light. Those interested in the company are Ransom Griffin, A. P. Conklin, R. H. Bruce, William F. Johnson and George L. Maas, all of whom are engaged in the lumber business.

1000 Miles through Colorado

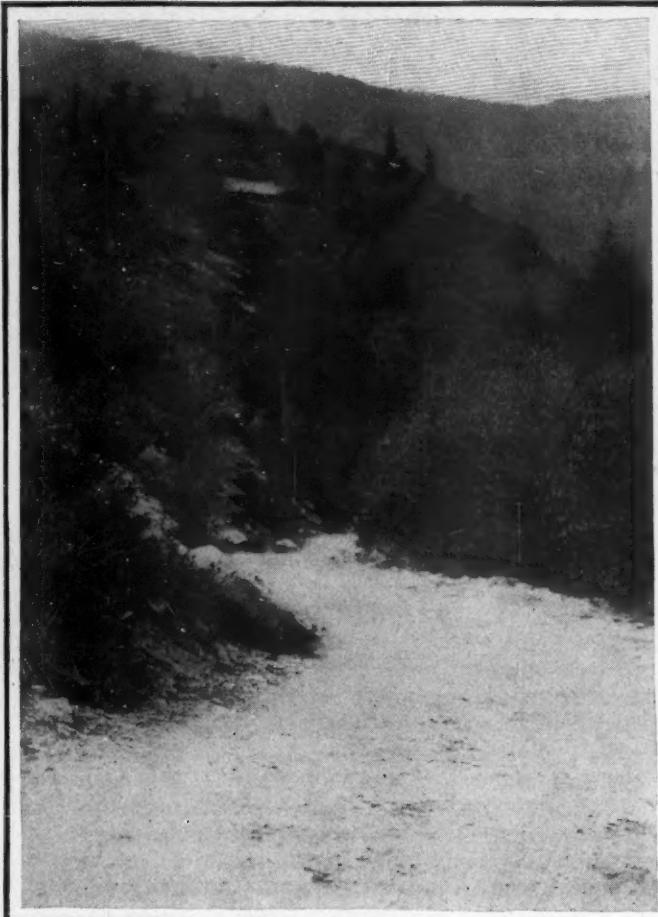


Through the Arkansas Valley



THE ARKANSAS VALLEY

TO THOSE unfamiliar with the Arkansas valley it is almost impossible to describe the wonderful charm of this beautiful valley with its almost ideal climate, particularly below Buena Vista. The upper Arkansas has its head waters above Leadville just below Tennessee pass at an altitude of nearly 10,000 feet. It flows almost directly southward between the Continental divide on the west and the Park range on the east through Buena Vista to Salida, where it turns sharply eastward through the Royal gorge to Canon City across the plains of southeastern Colorado. Between Leadville and Buena Vista the valley has many narrow places where the highway is literally cut out of the cliff. Between Buena Vista, Salida and Cotopaxi the valley is quite broad and flat with some of the most fertile and productive farms in the state. When the new highway between Cotopaxi and Canon City is completed the tourist will be able to follow very closely the course of the river practically all the way from its source to Canon City and probably nowhere will one be able to find such a variety of scenery



YONAHLOSSER ROAD BETWEEN BLOWING ROCK AND LINVILLE,
NORTH CAROLINA

ALMOST 4 years ago a number of farmers, bankers and editors, together with the county commissioners of the state, met at Wrightsville Beach, near Wilmington, N. C., in a convention. At this meeting, which proved to be a very interesting one, road conditions in North Carolina were discussed, a number of motor trips were taken over the fine shell roads of Brunswick county and steps were advanced to begin systematic road work in North Carolina.

Previous to this meeting Osmond Barringer and Joseph Hyde Pratt of good roads fame had been agitating the road question, one the advocate of good roads from a motorist's standpoint, the other talking about good roads and the advantages of them from the standpoint of a state geologist.

Good Roads Association Formed

In the early fall after the meeting at Wrightsville Beach in the summer Dr. Pratt organized the Southern Appalachian Good Roads Association at Asheville, N. C. The object of this association was the formation of organized forces in the states of the southern Appalachian mountains to arouse enthusiasm and to build roads in this the most beautiful country east of the Rockies.

Later in the autumn the movement started by the Atlanta Journal and New York World to push a great highway southward from Manhattan to Florida, be-

gan to come to a reality and almost before you could turn around a big scout car passed through the state preparing the way for the big final run. This was a memorable autumn. The enthusiasm worked up by the scout cars put the folks along the line on their mettle and many contests as to which county or which neighborhood should have the road was worked up and resulted in road improvement all along the line.

Notable among these contests was that between Guilford and Forsyth. Forsyth county, led by P. N. Hanes, a veteran good roads advocate, raised \$10,000 to improve the roads in an adjoining county to the north which was less progressive in order to turn the road to come through Forsyth. It was money well spent, for it gained for Winston-Salem one of the night controls of the trip. Not a citizen of the county regrets a dollar spent in this contest. Especially was this so when the seventy or more cars checked in before the Zinzendorf hotel on the first evening the tourists reached the state. Just here we stop to say this hotel with the long queer sounding name was named for Count Zinzendorf, who was one of the founders of old Salem.

These autumn days were golden days for the country lad along the route who stood by the wayside in the midst of the cotton or waving corn and watched the great caravan go by. It was Saturday of the run. From Winston-Salem on the north to Charlotte on the south these motoring missionaries of McAdam made the sixth day's run of the 10 days' tour from Herald square, Manhattan, to Atlanta, Ga. Throughout that territory they found material evidence that the Tarheel state grows not only cotton and tobacco but also the most genuine brand of southern hospitality as well as leather lungs that volleyed expressions of enthusiastic support of the good roads campaign.



Routes and

Motor Attractions of North Carolina—Enthusiasm Over Good Roads Has Aroused Notice to Need of Improved Highways

By J. Hampton Rich

North Carolina believes in the adage that actions speak louder than words. That day's route lay in part over macadam roads with here and there a stretch of sand and clay that for excellence ran a close race for supremacy with the modern highways of New Jersey and Massachusetts.

Within the few months previous, since the scout car blazed the new national highway which was now being dedicated by the motoring caravan, county after county had expended thousands of dollars in bettering its roads. These miles of stretches have been linked into the 1,100 miles of continuous traffic channel that runs its direct course from the metropolis of the nation to the gate city of the south.

Great Enthusiasm Displayed

These touring pilgrims again and again ran the gauntlet of ringing welcomes, whether in passing through cities or villages or in speeding along the roadways of the most remote of the rural districts. Under the stress of old-fashioned southern hospitality they encountered barbecues, roadside luncheons and village feasts spread in their honor until the mathematical expert of the party figured that each tourist had partaken of nine different and distinct meals before coming in contact with the commissary forces of Charlotte.

The day's run, a memorable one for North Carolina, has passed into history. It was a memorable one also to the tourists, for it passed under the blue skies that arched above the picturesque setting afforded by the North Carolina hills, brilliant in the glory of their blazing garb of autumn.

Moreover, autumn is the choice motoring season in North Carolina, though any month in the year can be used. Motoring in autumn through the mountains of North Carolina with a blue haze setting in rings over the "everlasting hill" and the air all "shot through with sunshine" has a peculiar charm.

This first motor run which passed through North Carolina that day has accomplished much. A trail of accomplishments in road building has followed. Feeders of the national highway, roads 'cross state have sprung into existence. One community has caught the fire from another until all the counties in the Piedmont or middle section of the state are alive to the importance and are voting bond issues for road building.

Touring Information



BEST TIME TO TOUR IN NORTH CAROLINA

	Eastern	Piedmont	Western
Choice months for motoring	Dec.-May, Jan.-Feb.	Sept.-Nov., Oct.-Dec.	May to Dec.
Rainy season.....	March to July	May to July	May to June
Too hot for comfort	May to September	June to August 15	No month
Slight rainfall makes roads better	December to May	July and August	August
Main attractions.....	Seacoast	Fine farms	Mountains
Cost of gasoline..	15 to 18 cents per gal.	15 cents	15 cents
Garage charges....	50 cents	50 cents	50 cents
Hotels	\$2.50 per day American	\$2.50 to \$5.50 Amer.	\$2.50 to \$5 American
	\$1 per day European	\$1 to \$2 Europ.	\$1 to \$3 European

Intersecting highways have been promoted across the state. Notable among these is the Charlotte to Asheville highway which leads down by Spartanburg, S. C. This is a favorite road for tourists. The Charlotte to Wilmington highway has not been fully determined further than Pinehurst. The Central highway, which has been mapped out and run by scout cars, starts at Morehead City and Beaufort, on the Atlantic ocean and traverses the entire length of the state. All these highways are in charge of special committees which make their reports yearly at the North Carolina Good Roads Association as to progress and upkeep of these roads. State Geologist Dr. Joseph Hyde

Pratt keeps in constant touch with these committees and is their advisory head.

Special mention is made of the Central highway, as it is the longest of all the roads promoted in the state, extending over 350 miles of sandy plateau and mountain country, ending at Murphey near the Tennessee line. Many points of interest are viewed on this route. No better idea of the state and its history can be gained than by traversing it when it is fully completed.

Attractions for Hunters

At its eastern terminus the motorist sees the great juniper forests and long grasses of the Dismal swamp country. These forests are so dense and thick that all kinds of wild animals live in them and every winter the hotels of near-by towns are filled with hunters who are there to hunt deer, bear, wolves and duck. Here the motorist may see the great inland waterway which is destined to stretch from Boston to Florida, furnishing a safe channel for coastwise vessels from the dangers of Hatteras.

Here the tangled brown mysterious mass of shrubs and vegetation on every hand mirror such a picture as never can be put on canvas.

The Dismal swamp has been a theme for story writers and the tourist stopping in this country on its edge will not be in a hurry to leave, for good hotels offer the best hospitality and a larder well filled with game of all kinds in season and

magnificent shell roads here and there for a morning spin add to the lure of the country. Old Newbern offers many attractions to the tourist. The long avenues of live oaks, the colonial-built houses, the old cemetery, the old fortifications of the civil war, the shell roads all offer interesting hours. The Central highway passes through Raleigh. Here is the ancient state house, the Worth Bagley monument, a great state museum and on the good roads surrounding the city, the rich farm lands of the Simpsons and Batts where 3½ bales of cotton have been raised on an acre and 226½ bushels of corn have been gathered from 1 acre of land.

In the Piedmont Country

It is near this point where Andrew Johnson was born. From Raleigh the Central highway passes up through the center of the state like a main artery, through Durham, the home of the American Tobacco Co., by Trinity college, the richest in the south.

Leaving Durham the motorist passes through Greensboro, where is located many of the 360 cotton mills of the state. The largest blue denim plant in the world is located here. Here is the model mill village where large money prizes are offered for the best-kept homes and grounds. From Greensboro the interesting city of Winston-Salem can be reached over the fine road which connects these two cities. Winston-Salem is a compactly built city of tobacco factories, cotton and knitting mills, situated in a most prosperous agricultural country on the slopes of the Blue Ridge. Moravians named their chief settlement in this Piedmont or "foot of the mountain" section, Salem, and then Winston developed at the court house square 1 mile away.

Winston-Salem Surroundings

At the Moravian burying ground at Salem the plain marble slabs lie flat on the ground, those of the men apart. Here every Easter morning the sunrise service is held. John Henry Boner, poet and editor, is buried in Old Salem cemetery. Besides the old brick buildings erected by the Moravians is the tavern which Washington occupied as he passed through with his army in 1781. The old woolen mill, still in operation, was built in 1758. This old mill is soon to be torn down and will be replaced by the railroad tracks of a new railroad into the city. A museum is filled with relics of Salem's past. As for the present there are 135 factories manufacturing 205 classes of goods. And this Forsyth county, of which Winston-Salem is the county seat, has about 100 miles of macadam and sand-clay roads.

Old Salem is the seat of Salem academy where the wives of eight presidents of the United States were educated. The wife of Stonewall Jackson claimed that institution as her alma mater.

The road has now reached Piedmont or middle Carolina, where there are the best roads. The road material used is mac-



ROAD NEAR ASHEVILLE, N. C., LEADING TO CREST OF THE BLUE RIDGE HIGHWAY

adam and sand clay. The roads in this section are good from the first of May till December, but as the soil is of a micaceous nature it easily wears and washes. The up-keep expense is heavy. Another attraction of this section is Guilford battleground.

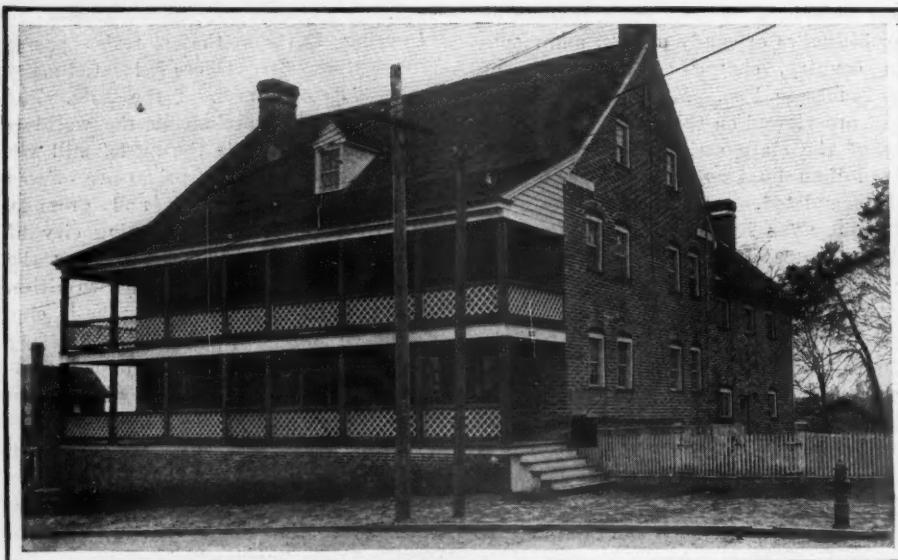
On the Central Highway

From the first of December till May the roads in eastern Carolina from Pinehurst and Raleigh eastward are at their best, as they are of a sandy nature. The winter resort at Pinehurst is very attractive and with the effort of the owner of that resort the roads through that section have become a delight to all tourists. No tourist should expect to go farther east than this point in summer, as the sand is too heavy for motor travel.

Leaving Winston-Salem on the Central highway, the tourist passes Lexington, Salisbury, Mooresville, Hickory, Newton



ENTERING CHARLOTTE OVER THE NATIONAL HIGHWAY



STOPPING PLACE OF GEORGE WASHINGTON DURING REVOLUTIONARY WAR

and then over a county of bad roads he races westward into Black mountain. Here is a little village of peculiar interest. It is on the crest of the Blue Ridge and surrounding it is beautiful mountain scenery. The surrounding mountains are filled with great resort places, built up by religious bodies and corporations.

Robert E. Lee hall has just been finished at a cost of \$125,000 with \$75,000 more to be spent on the grounds. This is the home of the southern branch of the Young Men's Christian Association. However, after these meetings are over in July the corporation invites tourists, and as it is on or near the crest of the Blue Ridge highway route it is destined to be one of the most popular resorts in the mountains.

Magnificent motor roads lead out into the mountains here in all directions. Gasoline can be purchased at Black Mountain.

From Black Mountain the tourist goes over a magnificent macadam road to Asheville. Here he finds a field ideal for tourists, with garages, with the best of hotel

accommodations, with another great hotel going up, built of the rocks just as they are dug from the mountain, and which will be most beautiful in its rustic appearance. This hotel will be on Sunset mountain and will be magnificent in its appointments.

On the Blue Ridge Highway

Here too the tourist will find many good motor roads which lead out through the mountains over bridges where streams dash in cascades and cataracts, rounding curves here and there in the road where gorgeous mountain scenery breaks upon the eye. Here at Asheville we leave the Central highway and take the crest of the Blue Ridge highway. This is a road which is now being constructed in western North Carolina, which when completed will rival all other highways in this country for rugged location and scenic beauty and it is the greatest undertaking in highway



construction that has been started in eastern United States. This highway is known as the crest of the Blue Ridge highway by reason of its location near the summit of the Blue Ridge, which it follows from near the Virginia line to Toe River Gap, a distance of about 150 miles, where it leaves the Blue Ridge proper and penetrates through the wild, rugged and picturesque Black and Craggy mountains to Asheville.

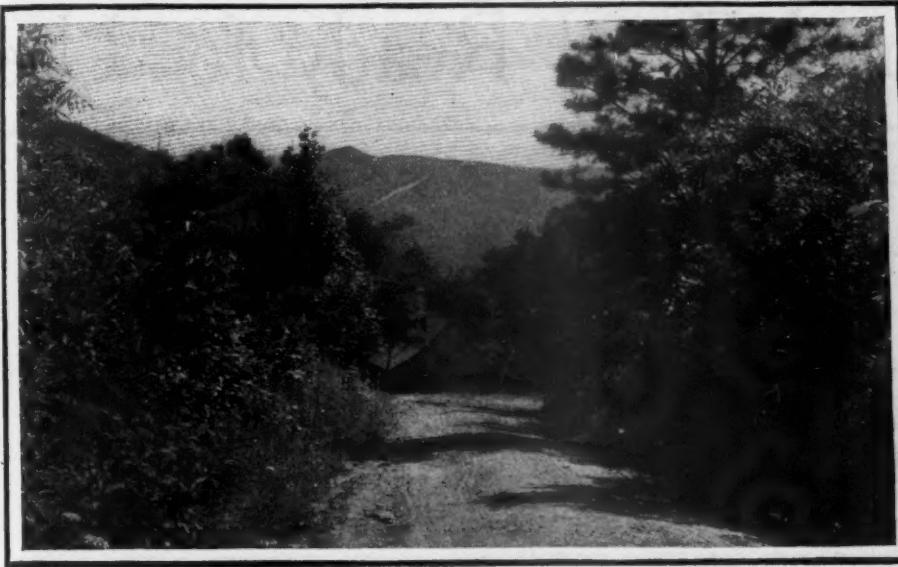
Southern Appalachian Roads

Although roads for scenic purposes have been built in European countries, they never have been built to any great extent in this country and none has been built thus far in the southern Appalachian system. The building of this road is one expression of the object of the organization of the Appalachian Good Roads Association 4 years ago. The scenic beauty of this highway will be its greatest single feature, for the mountains through which it passes are the highest east of the Rockies. The mountain slopes through which it passes are covered with a more varied fauna and flora than is found in any other section of the country.

Dr. Joseph Hyde Pratt, who is president of the company which holds a charter from the state of North Carolina to build the road, says:

"The grandeur of the scenery along this highway, comprising as it does extensive vistas into the Piedmont region, nearer views of valleys, and mountain tops and ridges, while here and there a most attractive waterfall and the highway crossing and passing streams of clear crystal water and penetrating the dense evergreen forests of balsam and spruce, whose deep shade always casts a feeling of awe over the traveler as he passes through them, will make a ride over this highway one never to be forgotten. When the plan of the highway has been worked out in its entirety, the highway will extend from Marion, Va., to Tallulah Falls, Ga."

A magnificent road is now complete from



ON THE WAY TO BLACK MOUNTAIN ON CENTRAL HIGHWAY

Lenoir to Blowing Rock and from there to Boone. Good hotels are at Boone. Garage service and gasoline may be procured here also. The Vonalo pike extends from Blowing Rock to Linville. Good hotels, gas and garage service may be had at Linville. These are parts and tributaries of the crest of the Blue Ridge highway which have been completed.

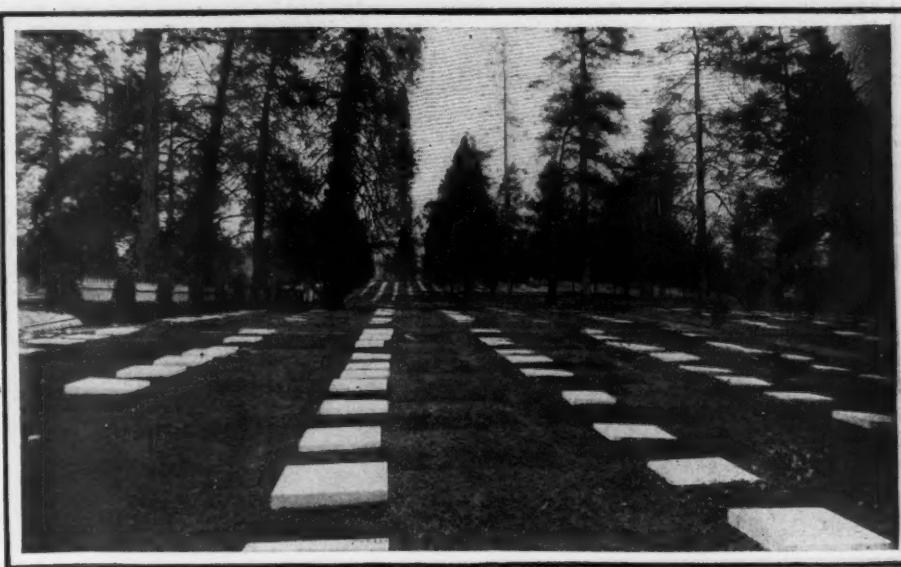
As to a few points of general information for the motorist in North Carolina: The fall and summer should be chosen for motoring in the Piedmont and western section of the state; the late fall and winter should be chosen as the season for motoring in the eastern section. It will be borne in mind the state has no large cities, but is full of smaller growing cities and towns. At practically all of these gasoline may be had. Garage service can be had at most of them. Garage charges are reasonable, generally 50 cents a night. Hotels charge an average of \$2.50 per day, American plan, or \$1 to \$3, European.

Especially pleasant for the late fall and winter season now approaching is the motoring in and about Pinehurst. There the roads are splendid, the days full of sunshine. Japonicas bloom in the open air in February in that country. The great strawberry fields and lettuce fields are green all the year round. Boatloads of fish come in, as many as 100,000 pounds in one haul. These are shipped inland.

Eastern Section's Drawing Cards

The colonies of emigrants in the eastern section near Wilmington may be seen with interest. Here successful colonization has been achieved on small farms of 10 to 20 acres. The golf links at Pinehurst furnish an attraction to passing winter motorists. It is a favorite liking of John D. Rockefeller to frequent these links each winter.

North Carolina has caught the good roads fever and it has caught for a purpose. That purpose is to turn the tide of some of the motorists who frequent Eu-



MORAVIAN CEMETERY IN OLD SALEM ON NATIONAL HIGHWAY

ropean capitals and traverse European roads and teach them by ocular proofs and undeniable facts that it is best to "See America first, a cry all should take up."

ARIZONIANS GOING TOURING

E. R. Pirtle, of Douglas, Ariz., state agent for the Cadillac, is arranging a tour over a route that is not surpassed in the United States for scenic magnificence. The route is from El Paso to the Grand canyon and return, and the tour will occupy 17 days.

All Cadillac owners and drivers will be invited to participate in the tour, which is to be held during February. Mr. Pirtle has just made a trip over the route and he declares that the roads are excellent most of the way. His car did less than 300 yards of low gear work. Moreover, he found ample accommodations along the way for a large party. Arrangements are

On the return to Phoenix the petrified forest and ice caves will be visited. At Phoenix the party will leave the route by be in the party.

While the itinerary has not been arranged entirely, no day's journey will be over 125 miles, and this only where the roads are very good. No more than 7 or 8 hours a day will be spent on the road.

In all probability the first night out of El Paso will be spent at Deming, N. M. The second day's run will be made through Lordsburg and Granite Gap to Douglas, Ariz.; the third day through Bisbee and Port Huachuca to Tucson. From Tucson to Phoenix will be 1 day's run, with a stop of several hours to inspect the state prison at Florence. One day's rest will be had in Phoenix and the next day the party will go to Prescott; the next to Flagstaff; the next to the Grand canyon.

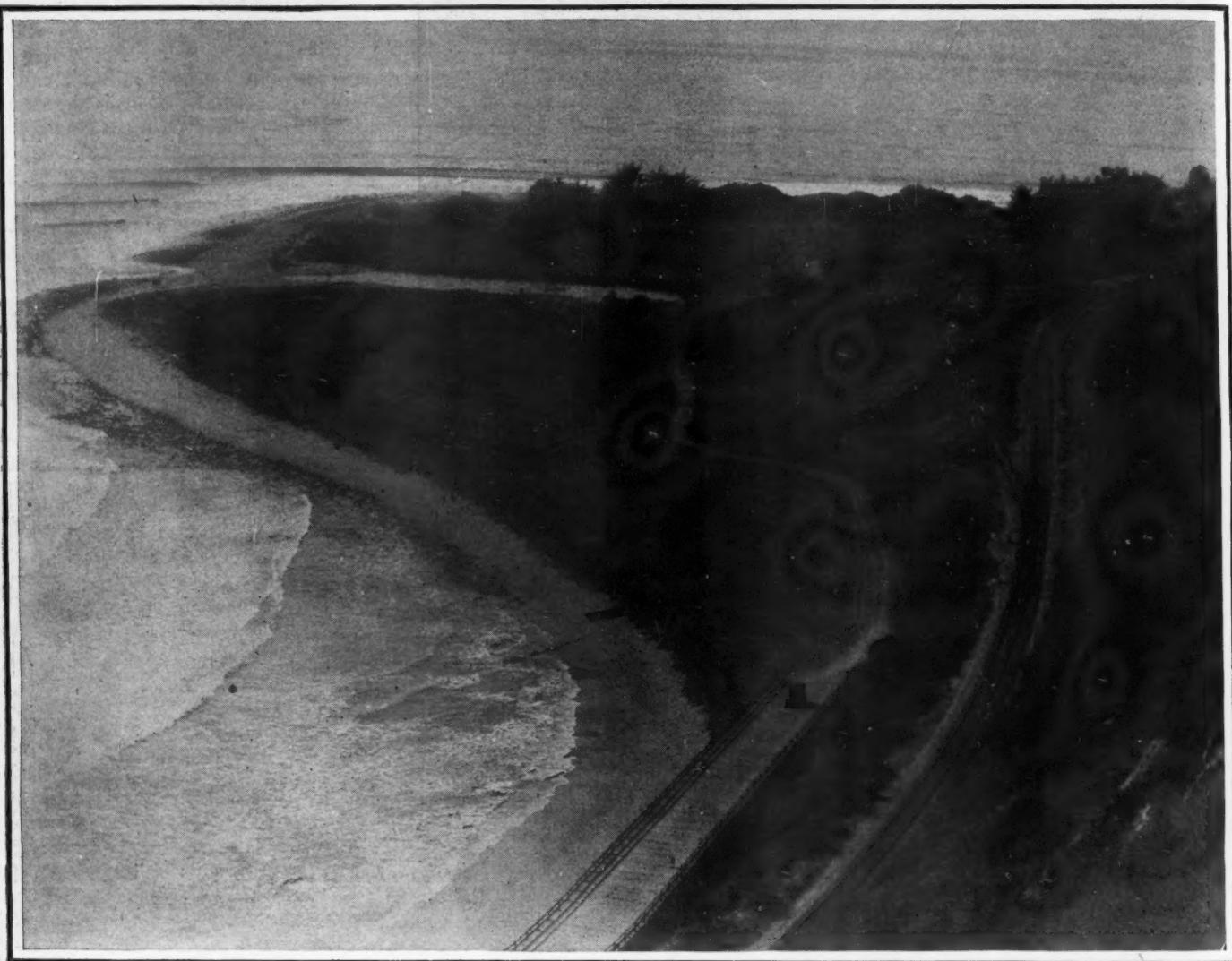
now being made for special rates at hotels and garages. A trouble car will be taken along with plenty of spare parts, tires, oil and gasoline. A physician also will which the outgoing trip is to be made and will go to Globe by way of the famous Roosevelt dam. The Roosevelt road is claimed to be the most beautiful and scenic in the United States.

The following day the Cadillac people will travel 60 miles through the heart of the Gila Indian reservation, where they will see the redskins living in wikiups the same as they lived 100 years ago. A stop will be allowed at San Carlos for the purpose of buying Indian baskets and trinkets. At Fort Thomas a drive through the beautiful Gila Valley, one of the garden spots of the southwest, will commence. The night will be spent at Safford.

From there the route continued through Solomonsville down through Ash Spring canyon. At Sheldon the Gila river will be crossed and a few hours more will take the party to Lordsburg, N. M.



California's Novel Road Ready for Use



BIRDSEYE VIEW SHOWING THE RINCON SEA-LEVEL ROAD

SHORTENING the run between Santa Barbara and Los Angeles by 9 miles and eliminating the dreaded Casitas pass which lies just beyond the mountains of the Rincon, are the two principal accomplishments of the Rincon causeway. The Casitas pass will still continue to share honors for scenic attractions for tourists, but for rapid transit a perfectly safe road in the Rincon is appreciated. The Rincon takes its name from the Rincon creek, the dividing line between Santa Barbara and Ventura county. The work lies entirely in Ventura county, and is 15 miles south of Santa Barbara. It is but a short distance after crossing the creek at the base of the mountain, to the first causeway, 2,000 feet long. This then leads over the unimproved road which is flanked with a rip-rap sea wall placed at a point where the tides of winter inundate the road. A few hundred feet beyond is a shorter causeway 400 feet long. About a mile of roadway follows and to the west at what is known as Punta Gorda is the last causeway, 4,400 feet long, the most picturesque of all and just completed. It has a number of windings, but not in the form of turns. There is a simple variety that will add pleasure to spinning over the firm and paved portion. From this causeway Ventura can be reached. The method of construction was simple. Eucalyptus piles were driven, cross beams were laid, then the floor of the causeway, and the wooden railings on each side. All causeways are 24 feet wide, and the flooring is of 3-inch lumber. In time asphalt will be laid.

SANTA BARBARA, Cal., Dec. 3—With a participation from Los Angeles that exceeded all expectations, the opening run of the Rincon sea-level road was held November 27. The feature of the day was a barbecue at Rincon Point, which was enjoyed by more than 2,000 persons.

It was variously estimated that from 500 to 800 cars were at the point during the day. They were constantly coming and going, so it was difficult to ascertain accurately. But at noon about 300 machines were parked on the beach just beyond the barbecue grounds, and within sight of the first 2,000-foot causeway. The

By Paul Gyllstrom

affair was very informal and served in early Spanish day style.

The participation was a surprise in every way. The Southern California Automobile Association had circularized its membership of 4,000, and the last report received here the Saturday previous was that 135 had indicated their intention of making the 100-mile trip. Allowance was made for shrinkage and about 100 were expected. The plan was to come to Santa Barbara Saturday, remain here over night

and return south to the Rincon Sunday morning in time to be present at the noon feed.

The first car, flying a pennant "Santa Barbara Rincon Run," arrived here at 11 o'clock in the morning. From then until evening there was a procession of cars similarly adorned and a check at the Potter and Arlington, the two principal hotels, showed that more than 150 cars had made the trip, breaking all state records for a run of this distance.

Saturday as well as the day decided upon for the semi-annual run of the club were perfect, even for California, which

claims to have the genuine article in that respect. There was not a speck on the sky and the temperature was as if made to order.

Two separate runs were conducted from the two hotels, with specially provided pilot cars. The line first went to the west of the city and over the newly paved Goleta road, then through Hope ranch, and back to the city by way of the Cliff drive, continuing on through Montecito and Carpinteria to the Rincon, 15 miles away.

The Montecito District

The fashionable Montecito district is now well roaded, but once past Summerland, with its famous oil wells sunk into the bed of the Pacific ocean, conditions were not the best. That lies in what is known as the Carpinteria road district, where a 12-mile stretch is being given a layer of concrete asphalt at a cost of \$85,000. Visitors to the state might have raised objections over some of the conditions encountered, but the southlanders viewed it all with interest—observing what a next-door neighbor, only 100 miles away, was accomplishing in the way of constructing highways. The roads were not bad, but then they were not the most inviting, and Los Angeles folk will within a year have occasion to note a transformation.

The barbecue was entirely free, the entire cost having been defrayed by the Santa Barbara chamber of commerce, which had stood sponsor for the project just completed. Phillip H. Rice, chairman of the chamber committee, which directed the Rincon campaign, was given final glory and work by being assigned to the chairmanship of the barbecue committee. He was assisted by C. G. Chisholm, George W. McComber and E. A. Diehl, and the four, assisted by Milo M. Potter, of the Potter hotel, received the 2,000 guests.

After appetites had been reduced and thirsts appeased, Frank E. Kellogg, secretary of the chamber of commerce, made the only address of the day, reviewing the Rincon history, and adding a bit of more

ancient tales. There was a combination of the utilitarian and sentiment about it all. This was originally part of El Camino Real or king's highway, established by the padres in early mission days, but the path along the coast at this point could only be traversed at low tide. Then came the stage coach, that interesting mode of transportation during pioneer days. Later a road was run through the Casitas pass, separated from the coast by a range of mountains. This served for nearly half a century, but there never was any agitation to obviate it until after the automobile became popular. Formerly the traffic was so slight as to be insignificant. But serious accidents occurred.

The necessity of such a road as the Rincon was appreciated by as important a man as E. P. Ripley, president of the Santa Fe, who makes his winter home in Santa Barbara. With others he incorporated a company 3 years ago, the purpose being to expend \$200,000 on a toll road, with the provision that it could be purchased at any time by Ventura county. But the Ventura supervisors would not give their consent and the project was abandoned, only to be taken up a few months later and carried to the conclusion that was celebrated recently.

Three Causeways

There are three causeways to a total length of 6,800 feet, the longest being 4,400 feet. Eucalyptus piling was used, the total number being 1,280. The structure is 24 feet wide and the floor is of 3-inch lumber. More than a million feet of lumber was used.

The entire stretch has been taken over by the state highway commission, and as early as in February it will start the improving of the rest of the road that skirts the Rincon. This road will connect with a concrete bridge over the Ventura river, now being constructed at a cost, with approaches, of \$75,000.

There is a bad section of road between the 2,000 and 4,000-foot causeways, but the state commission has already reconstructed

a rip-rap stone wall to protect the road from any possible action of the sea during the winter, when an occasional sou'easter pushes the sea in that direction. The causeways themselves lie well beyond the reach of the ocean during such turbulent periods.

Asphalt Contemplated

Aside from paving the road, the state commission also will give the causeways special treatment. It is understood it will adopt the suggestion of John Williamson, who built the causeways, and give the floor a layer of asphalt. Asphalt is here very cheap, as a bed, containing several million tons, is now being worked in Carpinteria.

The importance of the early improvement of the road was demonstrated Sunday. An effort was made to allay the sandy places, but the pounding of hundreds of cars soon broke this up, and a few got into the muss and had to be towed out.

The chamber of commerce has a little money left from its campaign, and will invest that on the road so that it may be passable during the winter. After a few showers all trouble will be over.

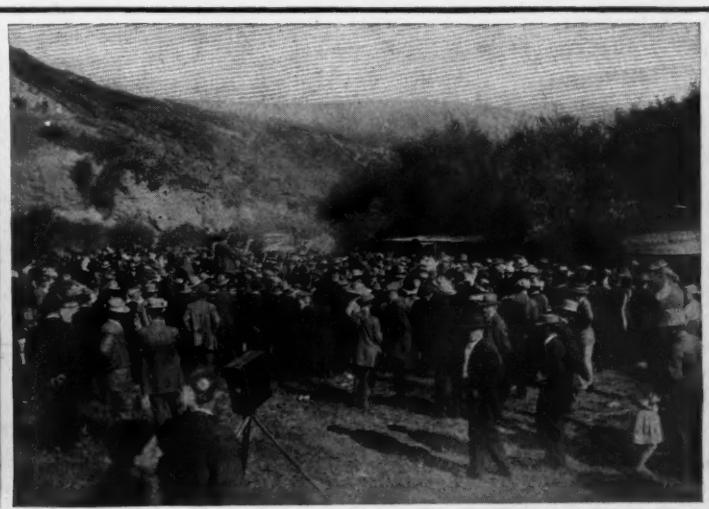
QUEBEC SEEKS NEW LAWS

Quebec, Ontario, Dec. 7—A delegation representing different motor clubs waited on the provincial treasurer yesterday, asking for certain amendments in the law governing motor cars. Among the important amendments asked is the increasing of the speed limit to 15 miles in the cities and to 20 miles in the country. At the present time the speed limit is 8 miles an hour in cities and 15 miles in the country. It also is asked that the distance for judging the speed of a motor car should not be less than $\frac{1}{8}$ -mile in cities and $\frac{1}{2}$ -mile in the country.

George McNamee, secretary of the Automobile Club of Canada, asked that the law be amended so that chauffeurs taking out cars without the knowledge of the owners should be liable for any damage which they cause.



MANY LOS ANGELES CARS AT RINCON POINT
BARBECUE



CALIFORNIANS CELEBRATE COMPLE-
TION OF SEA-LEVEL ROAD

The Edwards-Knight A New Car for 1913

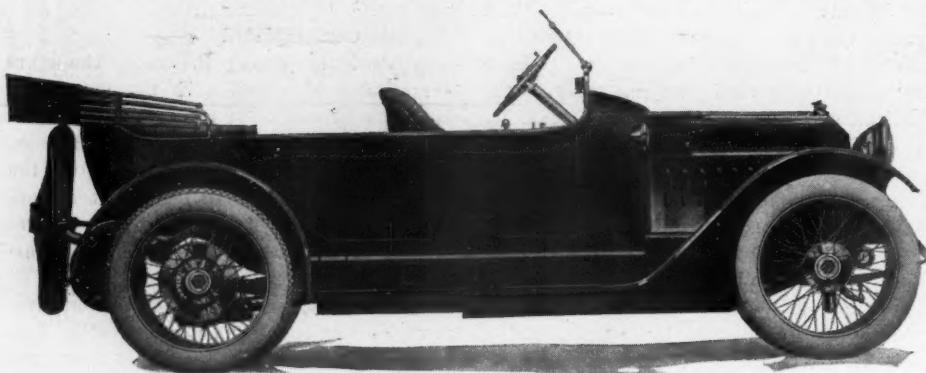


FIG. 1—EDWARDS-KNIGHT SEVEN-PASSENGER TOURING CAR

THE Edwards-Knight is out. This latest addition to the list of American-made cars was originally announced last February, when C. G. Stoddard and H. J. Edwards withdrew from the United States Motors and immediately launched the Edwards Motor Car Co., with headquarters in the Rubber building, New York city, and with factory at Long Island City. At that time announcement was also made that Messrs. Stoddard and Edwards had secured from Knight and Kilbourne the last American license to build motor cars under Knight patents; that is, double reciprocating sleeves in place of poppet valves. From that time until the present every effort has been bent on the new Edwards-Knight, illustrated herewith.

The Edwards-Knight is a specially designed machine from radiator to rear axles and incorporates within its makeup more of the recognized European features of construction and the most advanced American practices than any other domestic cars today. To summarize, it is a 25.6-horsepower, four-cylinder type, 4-inch bore and 5.5-inch stroke; the motor uses silent-chain drive for the eccentric and magneto shafts; it is positive non-splash lubrication to all bearings; it has an electric self-starter incorporated within the enclosed flywheel; the dry-disk clutch is carried in a separate compartment in the forward part of the gearbox; the gearbox is flexibly supported and has four forward variations; worm-drive is used in the rear axle, with the worm beneath the axle, yet affording a 9.25-inch clearance; detachable wire wheels with Q-D rims are used; the steering wheel is on the left side with center levers; Lanchester patent springs are used in the rear, and the frame is double dropped.

Full Line of Bodies

On a chassis comprising these features and made with 120-inch wheelbase is fitted a complete body series, two-passenger roadster, two-passenger speedster, four-passenger torpedo, five-passenger touring car, seven-passenger limousine and seven-pass-

senger landauette. The prices range from \$3,500 to \$4,700.

Novel Features Incorporated

H. J. Edwards, whose engineering career in America dates from the early days with the Cleveland car, after which he took the Stoddard-Dayton in its infancy and developed it to its present state, and then later took the entire charge of the U. S. Motors engineering, has put a year's study into the present car, and in addition to the cardinal features enumerated, has incorporated many other improved constructions. The present chassis, officially labelled model 25, incorporates new features in rear axle torque absorption and also in radius rod construction as well as universal action in the propeller shaft.

The motor, while a Knight design, incorporates all of the 1913 improvements that the European licensees have made in it, including long-stroke, namely, a stroke-bore ratio of 1.35 to 1, longer stroke of the sleeves, making both inner and outer sleeves the same thickness, and change of timing to give a maximum opening of the ports on both intake and exhaust strokes.

The cylinder castings made in pairs are imported as are the cast iron sleeves and pistons. The cranecase is a two-part aluminum casting carried at four points H, Fig. 3, through a hinge action with a frame bracket, thus freeing it from frame twists. Water pump, Simms' magneto and

tire pump are grouped on the right side, all driven from a longitudinal lay shaft; on the left is the SU carburetor and air pump for gasoline tank pressure, leaving this side specially clean for the left-side steering column. The entire motor design is cleanest. The intake manifold is four branches direct from the carburetor union to the cylinders, the intake water pipe is a T and the return one a horizontal lying close to the heads.

The motor uses a five-bearing crankshaft of large diameter, with all main bearings and crankpins drilled for lightness. The flywheel anchors to an integral flange and at the center bearing are two flanges, Fig. 4, which care for end thrust. The bearings are bronze lined with 1-32-inch of babbitt. Adjacent to the flywheel flange is an integral ring to prevent oil working out past the bearing.

Connecting rods are hollow tubular forgings of round section, being drilled out to reduce weight and leaving a wall thickness of $\frac{1}{8}$ -inch, which is increased to 5-32-inch at one-third the height of the rod, which is the point of greatest strain.

Pistons, conventional Knight types with the concaved heads, carry three eccentric rings above the wrist pin and are relieved from the lower ring to the wrist pin to facilitate lubrication. The skirt or lower part is perforated to give lightness.

The wrist pin is a hardened and ground steel tube working in a steel bushing in the rod, the bushing being hardened, ground and lapped.

Silent Chain Camshaft Drive

According to general custom in Knight-type motors, silent chain is used to drive the eccentric and lay shafts. Two chains are employed, Fig. 4. One to the left side drives the eccentric shaft and one to the right the magneto and pump. Both chains are non-adjustable type, the eccentric shaft one running on pulleys with 6.676-inch centers and that to the magneto with 8.8125-inch centers.

The operation of a silent chain largely depends on its lubrication, which in this case is through the forward end of the drilled crankshaft and out through radial holes and thence by centrifugal force outward through holes drilled in the pulley into the chain. In turn, it works outward through the linkages of the chain.

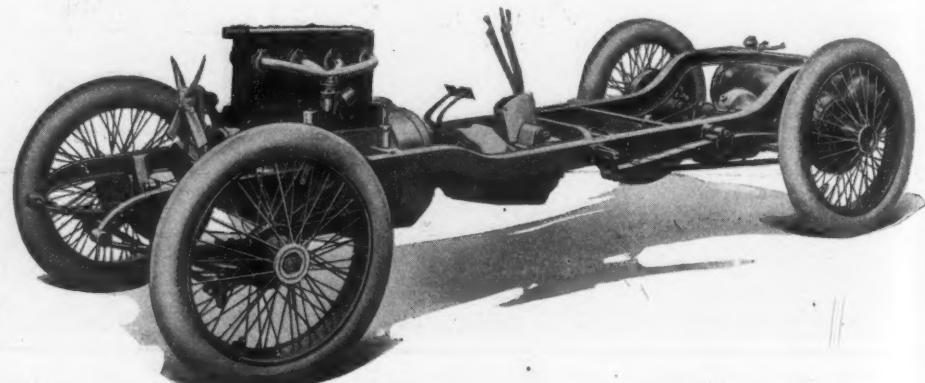


FIG. 2—INTAKE SIDE OF EDWARDS-KNIGHT CHASSIS

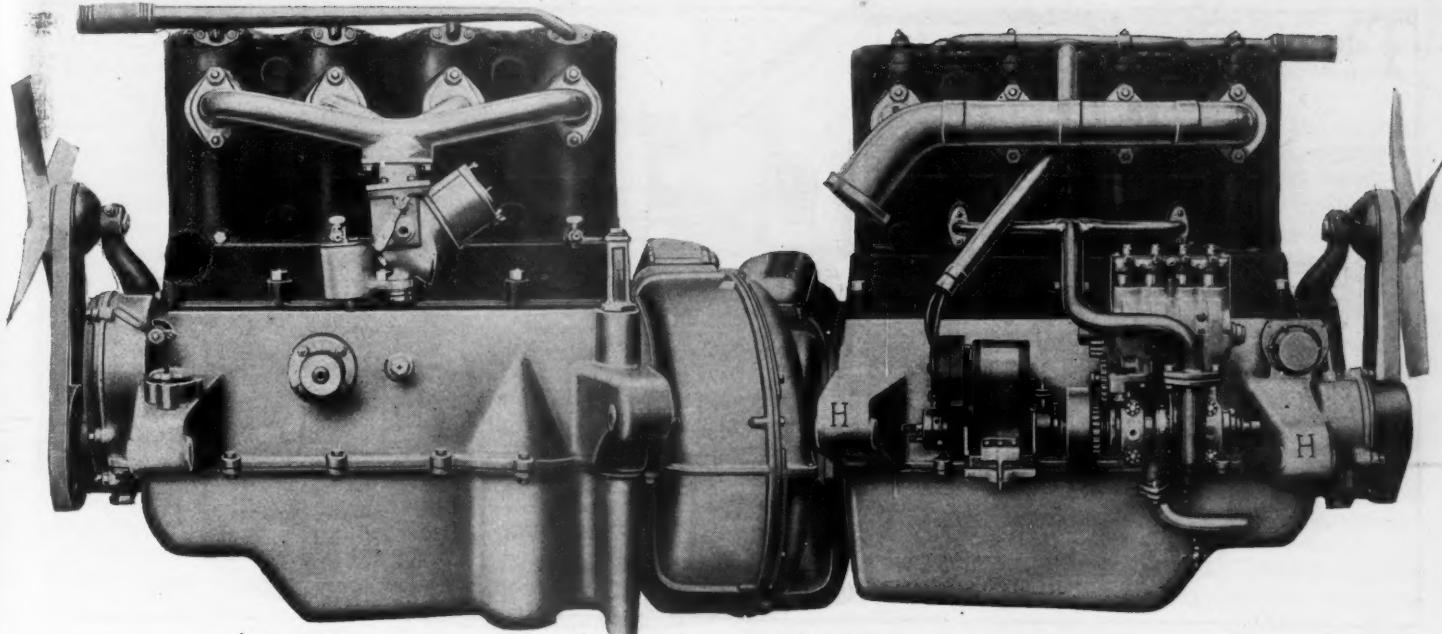


FIG. 3—RIGHT AND LEFT SIDES OF EDWARDS-KNIGHT FOUR-CYLINDER MOTOR

The operation of the sleeve valves is sufficiently well understood as not to call for explanation further than that they have a reciprocation of 30 millimeters or 1.18-inch, which is longer than previously used and results in longer intake and exhaust port openings. The intake ports are on the left side, the exhausts on the right and both have a circumferential length on the sleeves of 3.5 inches. The intakes are .472 inches high, the exhausts .70 inches. In other words, the intake port is equivalent to 1.645 square inches opening and the exhaust port 2.45 square inches. The intake opens 15 deg. late and closes 36 deg. late, giving it an opening of 210 deg.

Action of Sliding Sleeves

The exhaust opens 55 deg. early and closes 5 deg. late, a total opening period of 240 deg. With the Knight-type motor the power efficiency is due not only to the area of valve openings, but also to the length of time they remain open as well as the rapid opening and closing. This quicker opening and closing is due to the two reciprocating sleeves, which are so timed that in intake opening the inner sleeve moves up and the outer sleeve down. The inner sleeve is beginning its acceleration and the outer sleeve is at its maximum speed of travel. To close the intake port the inner sleeve alone moves upwards at maximum travel against the junk ring in the cylinder head, which gives the gas sealing necessary to prevent escape of pressure on compression or explosion strokes. Then, too, with the exhaust ports they open by the inner sleeve lowering at maximum speed from the junk ring; and they close by the outer sleeve on its downward motion.

Lubrication is an improved non-splash pressure system without any auxiliary feeds to cylinder heads or sleeves. A single-plunger oil pump located within the crankcase base supplies lubricant at a pressure varying from 2 to 20 pounds, ac-

cording to the demands. The plunger P, Fig. 9, operates direct from the eccentric shaft and works in an oscillating cylinder C, whose oscillations are so timed that its bore registers with the intake pipe from the oil well W on the upstroke of the plunger and with the discharge pipe opening D on the downstroke. The discharge pipe connects with a large conduit W incorporated in the crankcase when cast, and which conduit has distributing branches to all five of the crankshaft bearings; thence through the drilled crankshaft and the hollow connecting rods and hollow wrist pins the positive oil pressure of the pump reaches all of the important motor bearings and also the sleeves, pistons and cylinder wall. With the throttle practically closed, but 2 pounds pressure will be fed to the motor part, but with it open the pressure will be 20 pounds. The motor base has an oil capacity of 2.5 gallons. On the rear left motor arm is an oil indicator and on the front left arm a filler opening.

Stock equipment includes an electric self-starter of the U. S. Light and Heating Co.-type incorporated within the flywheel and being entirely incorporated within the housing containing the flywheel. Ignition on Edwards Motor

Ignition is entirely separate from the starting system and is a Simms magneto connected with a single set of plugs in the center of the domed cylinder heads. The magneto is driven through a continuation of the water-pump shaft which incorporates a flexible coupling consisting of an internal and an external gear. Coupled direct to the magneto is the internal drum-like gear, G, Fig. 4, which receives the external gear GI on the pump shaft. The magneto timing can be adjusted by changing the mesh of the gears. Closely associated with the ignition system is that of the four-cylinder power tire pump driven by gear from the pump shaft. The pump is snugly nested above and back of the pump.

The S. U. carbureter is an English pro-

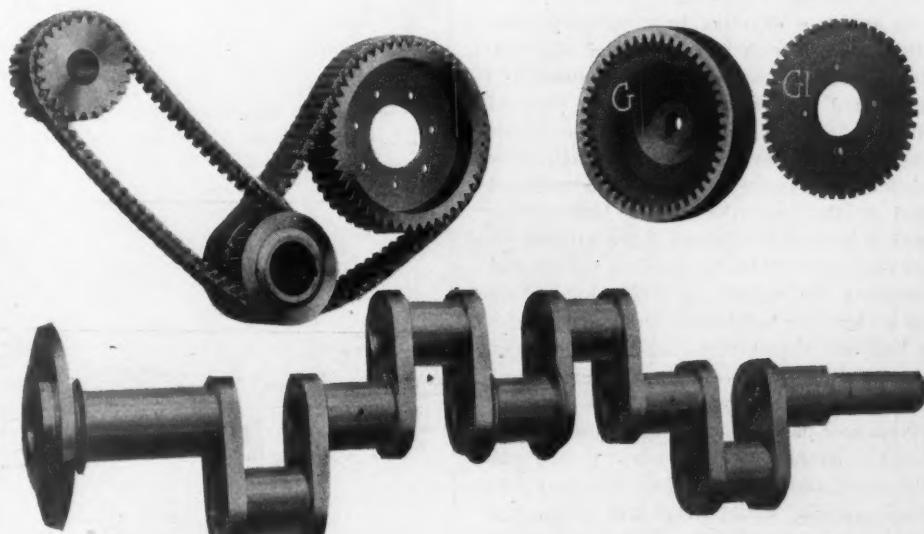


FIG. 4—FIVE-BEARING CRANKSHAFT AND CHAIN ECCENTRIC AND MAGNETO DRIVE

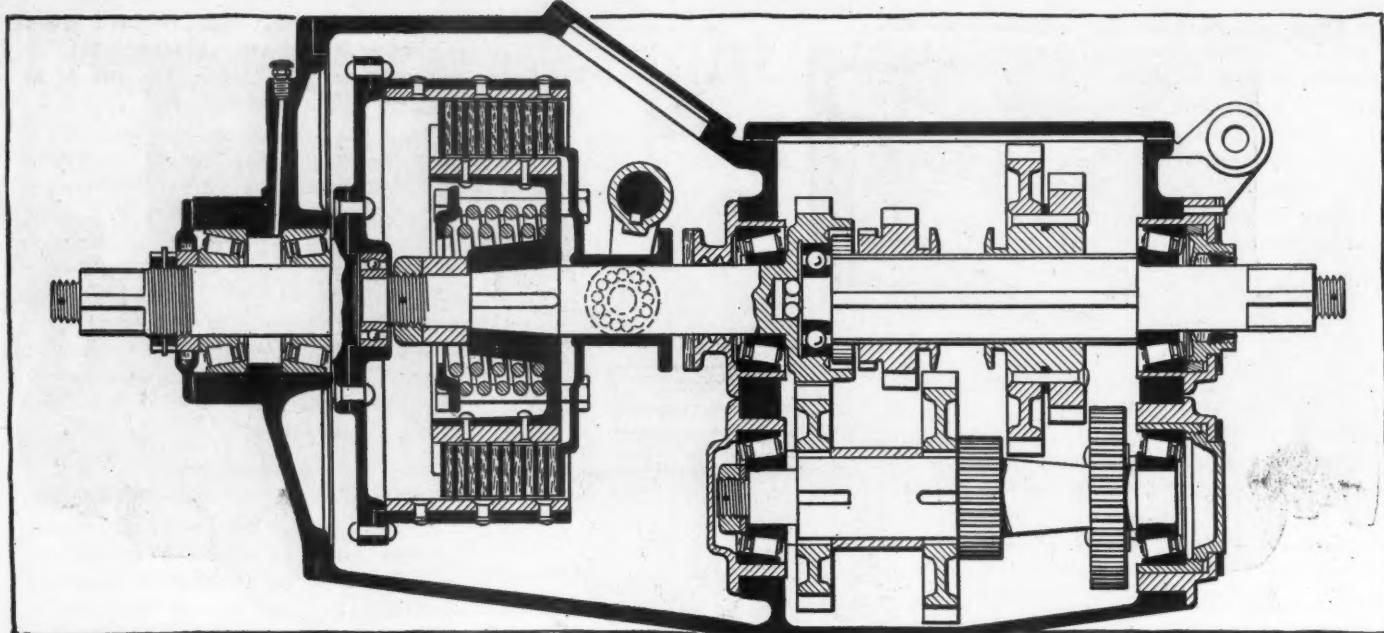


FIG. 5—CLUTCH AND GEARSET ASSEMBLY OF EDWARDS-KNIGHT CAR

duction, the manufacture of which in America has been secured by the Edwards company, and its cardinal characteristic is that the area of the air space surrounding the nozzle is automatically varied by the motor suction acting on a bellows which controls in turn a piston. This piston obstructs the air passage. With high motor speeds the piston is drawn out of the passage, increasing its area and thereby lessening the suction on the gasoline in the nozzle and giving that desired reduction of richness in the mixture, whereas with low motor speeds this governing piston largely obstructs the air passage thereby increasing the suction pull on the gasoline in the nozzle and giving a richer mixture. The governing bellows is contained within the cylindrical part of the housing, Fig. 9, which is mounted at approximately 45 deg. Air pressure is by pump A on the motor, Fig. 9.

While the Edwards-Knight motor has its many details of interest, the transmission system also has its interest. Part I in this is the combined gearset and clutch, Fig. 5, the clutch a dry-disk type with its steel disks faced with asbestos and all contained within a separate compartment and supported in front on a double race of Timken rollers and in rear by a single race without any universals needed. The clutch shaft is carried within the recessed end of the crankshaft in a ball-bearing and it is formed with an integral gear on its rear end within the gearbox proper and supports the mainshaft M of the gearset on an annular ball-bearing and carries also a ball end thrust race. The remainder of the bearings of the set are Timken rollers, the short-series type, oil-tight bearing plates and packing are used to prevent oil leaks. Nickel steel is used throughout for gears and shafts. There are four forward speeds with direct on third, the fourth being indirect. The gearbox is flexibly mounted on two frame cross mem-

bers, in front through a trunnion and through two points in its rear where a fore-and-aft hinge motion is afforded.

The Edwards-Knight is a straight-line drive product in that the motor is mounted to decline slightly to the rear, to be accurate the angle is 4 deg.; and the gearbox is similarly declined, so that with the car loaded the crankshaft, the main-shaft of the gearbox, the propeller shaft and the worm shaft in the rear axle are all in a straight line.

To understand the merits of the propeller shaft system it must be remembered that a torque rod and two distance rods

are used and that the length of these is such that they work in unison and eliminate all sliding movement in the universal joints. There is a further fact in this connection, namely, that the angles in the front and rear universal joints are the same at all times; namely, the angle between the gearset shaft and the propeller shaft equals the angle between the propeller shaft and the worm shaft in the rear joint, a fact which neutralizes the acceleration and retardation which take place twice during each revolution in a universal joint.

Features of Propulsion

Radius rods have a ball-and-socket front end support and a ball rear end support.

The torque rod, a tapered tubing, is doubly flexibly supported in front. Fig. 8 shows the ball-end stud carried in a cross member of the frame and the similar end on the torque tube. The vertical tube, containing them, has four coil springs, one above and the other below each, so that the utmost universal action is obtained. In action this torque member synchronizes with the propeller shaft and radius rods in that its front end is midway between the front and rear universal joints.

The worm-driven rear axle is a Timken housing with a David Brown straight-type worm mounted underneath the bronze

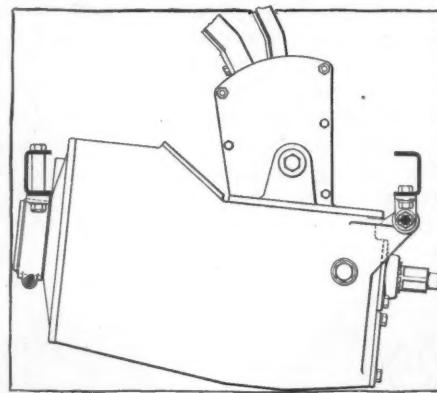


FIG. 6—EDWARDS CENTER CONTROL MOUNTING

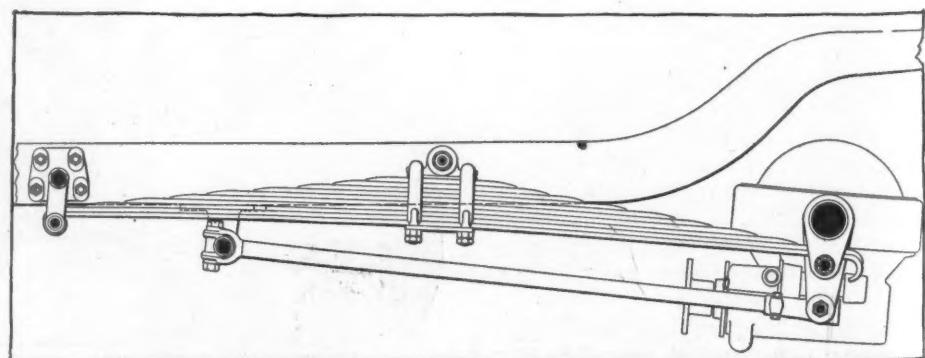


FIG. 7—LANCHESTER PATENT REAR SPRING ON EDWARDS

worm wheel. The axle housing is a standard type of Timken stamping with the differential expansion placed horizontally instead of vertically, as in the bevel-driven axle. The worm shaft is carried fore and aft on special non-adjustable Timken rollers, their end-thrust merits eliminating special end-thrust bearings. The unit made up of the worm and worm-wheel with differential is mounted in a steel casting which is hung in the under side of the axle stamping. There is a 4 to 1 reduction between worm and wheel. The axle is a floating type, and carries standard internal and external brakes.

Lancaster Rear Springs

The Lancaster rear springs, Fig. 7, are inverted semi-elliptics supported in their center to the frame through a trunnion; shackled to the frame at their fronts, and carried underneath the axle at their rear where they are not shackled, but bear upon a roller, thus allowing for free back and forward motion. The merits of this spring are several: First, the entire weight of the spring is supported on the frame, thus taking that amount of unsprung weight off the axle, which is desirable in that the more unsprung axle weight there is the more tire wear. Second, with this spring there is twice the up and down movement for the same opening of the spring as compared with a semi-elliptic. This cuts the periodic time of spring vibration in half, giving a slow period of vibration and easy riding. The spring is 54 inches long and is a simple suspension member, being freed from driving strains by the radius rods.

In the running gear the double-dropped frame gives a low body, the drop being 3 inches at the dash and 7 inches in advance of the axle. Tires are 36 by 4.5 inches all around.

BAY STATE MOTORISTS ALARMED

Boston, Mass., Dec. 7—Further evidence that there is a possibility that the speed law of Massachusetts may be amended, or an attempt made to do so, when the next legislature convenes is found in the communication sent by the Massachusetts highway commission to Francis Heturis, Jr., counsel for the National Automobile Association on the speed laws, in answer to a query by him. In this letter the latter part of it refers to a fixed speed limit, and the highway commission recently having approved a limit of 25 miles an hour for the Nahant boulevard, the indications point to a change. It took 4 years of fighting, from 1902 to 1906, to get the present law allowing a reasonable and proper rate of speed to get on the statute books and a change now would not be advisable. Here is the letter:

Your letter of November 21, calling attention to the numerous complaints made to the National Automobile Association as to the over-speeding of motor vehicles on the public highways, has been received and presented to the commissioners, and they have directed me to state that, in their opinion, there is just cause for complaint, as the number of cases of over-speeding, improper and reckless driving this year is greatly in excess of that of former years, and that they believe that your association can do a great deal of good by taking the

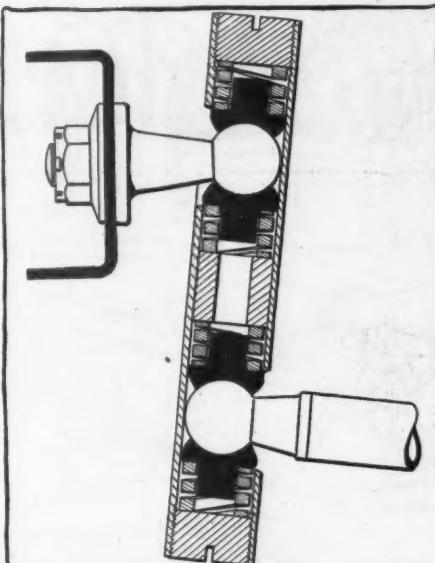


FIG. 8—BALL-AND-SOCKET SUPPORTS OF RADIUS RODS

matter up seriously and attempting to see that motor cars are not operated improperly or at excessive rates of speed.

The commission is inclined to think that it might be wise for the legislature to enact a law fixing a maximum speed limit of 25 miles an hour, as this season, especially after the entry of cars from other states which allow high rates of speed, there was a marked increase in the number of cars running at excessive and dangerous rates of speed.

Judging from this it would not be surprising if the highway commission in its annual report to the governor, which is made each year about January 1, suggested that a change be made. This will mean a fight, of course, on the part of the

motorists, for other New England states patterning after Massachusetts, would do the same, and 25 miles an hour would be the limit in all New England.

This would lead to the old trap system again in many places and the motorists would be the victims. What the commission may have in mind, judging by its past performances in securing legislation, is to suggest 25 miles an hour, and then after a fight, agree to a law for 30 as a compromise. So this will probably be one of the real fights on the next session, and it will be of much interest to motorists everywhere now that New England is so well traveled each summer.

WANT STATE TO TAKE THE ROAD

The Massachusetts highway commission has been asked to submit an estimate of the cost to put what is known as the North Pike road that runs through the towns of Clinton, West Boylston and Sterling into first class condition. The selectmen of all three towns had a conference recently on the matter following an inspection of the highway which was once in fine condition but which is now dangerous for travel and as the towns would be liable for damages the officials want to prevent suits in future. If the road can be put in shape for a reasonable sum the towns will pay the bill and then request the state highway commission to take it over as a part of the highways under its jurisdiction.

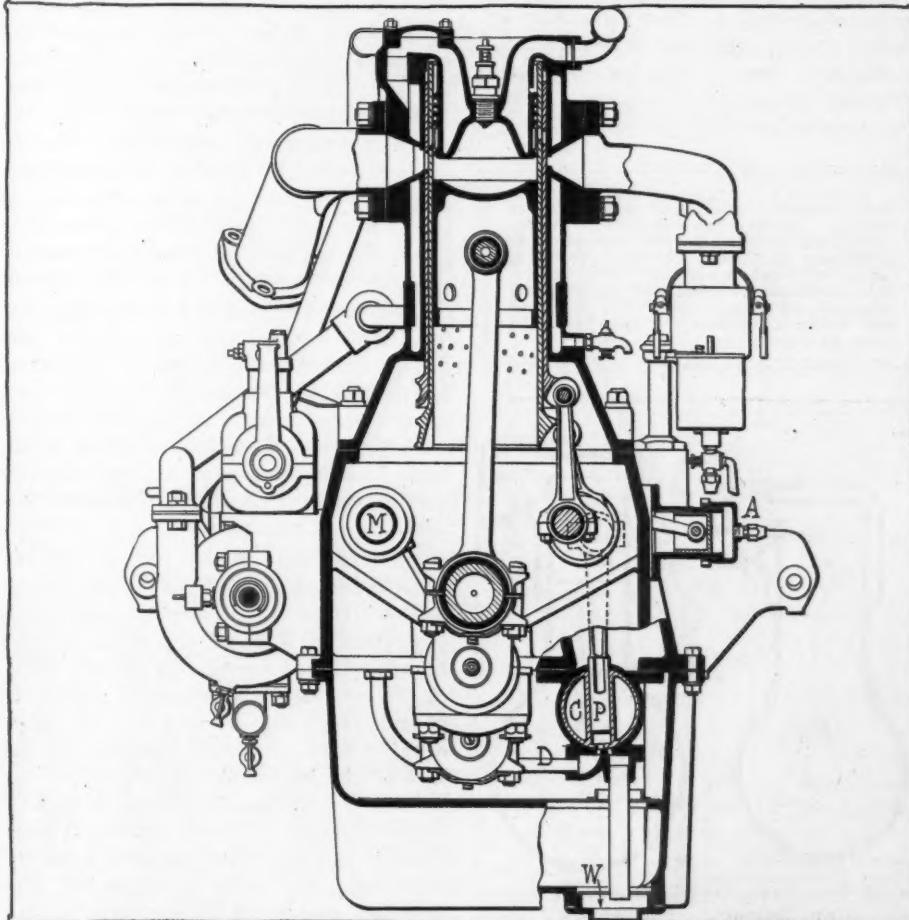


FIG. 9—VERTICAL END SECTION OF THE EDWARDS-KNIGHT MOTOR

The Long-Stroke Motor

Correspondent Reviews Discussion
by Duryea and Others and
Draws Conclusions

B RIDGEPORT, CONN.—Editor Motor Age—The interesting discussion which has been going on in the columns of Motor Age, upon the relative merits of the long and short stroke motor has aroused me to the point where I wish to avail myself of the privilege of its columns to express a few views in the hope that the resultant discussion will clear the matter up.

In the first place, in comparing the long and short-stroke motors, in actual operation as well as from a theoretical standpoint, should not one specify that the motors under comparison besides having the same piston displacement also should have the same percent of compression volume?

It is obviously unfair to compare a short-stroke motor of 24 or 25 percent compression volume with a long-stroke motor of 30 percent compression volume, or vice versa. It is well known that from both theoretical and practical considerations the motor having the higher compression of the two is more powerful and more efficient. The instant of maximum temperature occurs when the gas is at a smaller volume and the surface available for conducting heat to the jacket water is less, consequently the motor converts more heat into mechanical work than the low-compression engine. The volumetric efficiency of the high-compression motor is higher than that of the low-compression motor as the percent clearance is smaller and scavenging more perfect. The pro-

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear he may adopt a nom de plume.

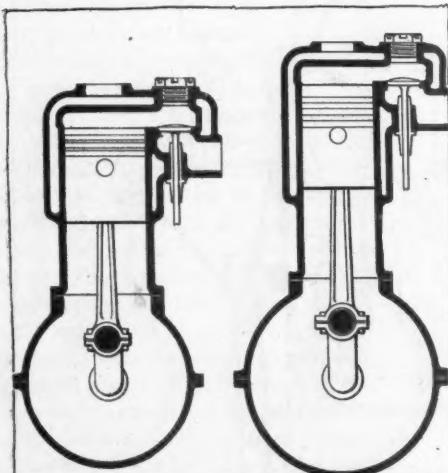


FIG. 2—DIFFERENCES IN LONG-STROKE AND SHORT-STROKE MOTORS OF SAME DISPLACEMENT

The Readers

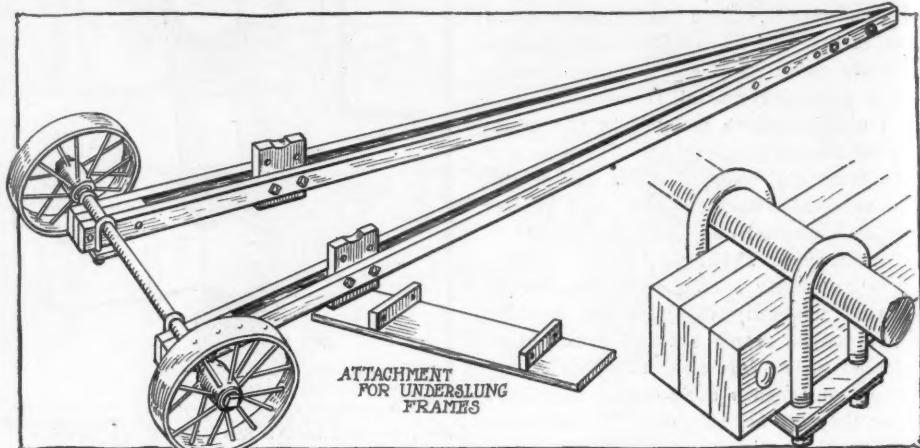


FIG. 1—CRADLE FOR THE TRANSPORTATION OF CARS WITH INJURED REAR AXLES

pagation of the flame through the charge is more rapid and this results in a higher explosion pressure and temperature. Experimental results show great gains in power and efficiency due to employing high compressions. From the foregoing I think that the two types of motor should have the same percent of compression space to displacement.

Mr. Duryea points out in his letter of November 14 in Motor Age that the ratio of expansion is dependent on the valve timing employed measured in degrees or percent of piston travel and that the earlier the exhaust valve opens the lower is the ratio of expansion of the gas compared to the volume drawn in.

Finally, the comparison between the two motors should be made at the same number of revolutions per minute and not at the same piston speed as is often done. This will no doubt be vigorously opposed but my reason for this suggestion follows.

The motors having the same piston displacement and percent compression, and being similarly timed, will at the same number of revolutions per minute draw in the same volume of air and fuel so that the heat available per stroke is the same in each motor, and any difference in performance will be due to inherent characteristics of the motors.

With the same volume of gas and the same compression the pressure of the explosion and M. E. P. should be the same, neglecting any difference in radiating surface in the two combustion spaces. Then in the case of the short-stroke engine we have a large net pressure on the piston working through a short distance. In the case of the long-stroke engine we have a smaller net pressure working through a longer distance. From a purely thermodynamic standpoint the motors are exactly equivalent, but from a mechanical and structural standpoint there appears to be a difference.

To illustrate, assume two motors of the same type, same piston displacement, compression, valve timing, etc., one 4.5 inches by 4.5 inches and the other 4 inches by 5.7 inches. Assume an explosion pressure in each case of 300 pounds per square inch. The area of the square motor piston is 15.904 square inches and the net pressure on the piston at the moment of explosion is approximately 4,780 pounds; while for the long-stroke motor with a piston area of 12.566 square inches the net pressure on the piston will be 3,770 pounds, a difference of 1,010 pounds.

This permits the use of lighter pistons and connecting rods, shorter bearings, or lower bearing pressure for the same length of bearing. In the latter case the loss due to friction in the main bearings and connecting rod bearings is less for the pressure per unit of area is reduced and the rubbing velocity remains the same as the engines are being compared at the same revolutions per minute. The bearings are the same diameter, as the torque is the same under the assumptions made. The bearing friction losses and connecting rod bearing losses which are dependent on the velocity of the rubbing surfaces and the pressure between them will be less in the long-stroke motor for the above cited reasons.

If the angularity of the connecting rods is made the same by lengthening the rods of the long-stroke motor in proper proportion, the pressure of the piston against the walls of the cylinder is reduced in total—the load on the piston being less and the angularity of the rods being the same—but the rubbing velocity is greater and hence these two factors tend to balance one another, the piston friction losses being the same in the long and short-stroke motor. I believe when designers go to either extreme in design the product of these two factors tends to increase and wipe out what is gained elsewhere. Ex-

Clearing House

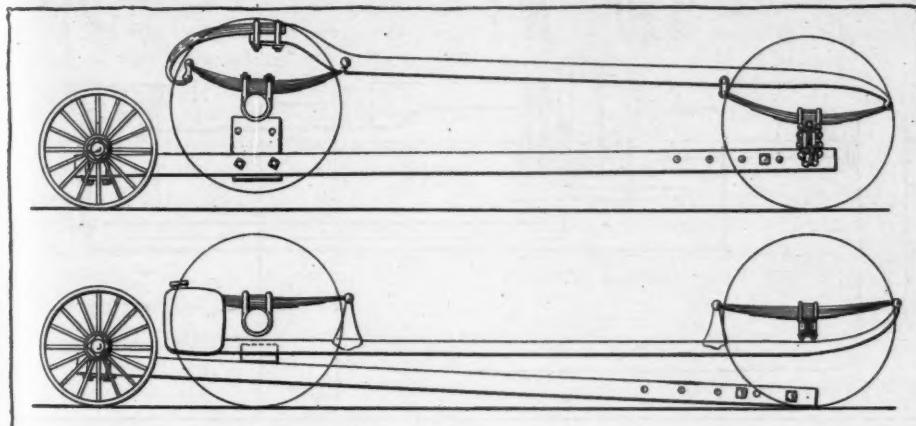


FIG. 3—APPLICATION OF APPLIANCE FOR CARS WHICH HAVE MET WITH ACCIDENTS

periments appear to bear this out as there is a slight improvement in the motors as the ratio of bore to stroke is increased to 1:1.2 or 1:1.3 and beyond that no advantage is realized.

On the other side of the Atlantic engineers have demonstrated the advantages of the long-stroke motor more thoroughly than has been done here. They have been able to concentrate enormous power in comparatively light motors by running at very high piston speeds, without sacrificing consistency of running smoothness or flexibility; in fact they have gained considerably in all these features. With very large square motors it is a problem to keep the face of the piston cool and the record of seized pistons in races is against the square motor. The problem confronting the designer is: given a motor of certain required power and piston displacement, compression, etc., shall it be a square motor or a medium long stroke.

—Delmar G. Roos.

Figs. 2 and 7 illustrate the points referred to in Mr. Roos' discussion.

AIR STARTER FOR STEVENS-DURYEA

Madison, Wis.—Editor Motor Age—I drive a 1912 model A A Stevens-Duryea and am anxious to know the possibilities of installing a compressed air starting system. I see no reason why the air distributor could not be mounted where the present Kellogg pump stands, but am at a loss to know where to install the pressure pump. Would the present pump, which is of four-cylinder design, do? The car is equipped with a gas starter. Could not the leads from the air distributor enter the cylinders through the openings of the petcocks now employed.

dresses of manufacturers marketing start-

2—Please give me the names and adding systems of this type that you could recommend.

3—I would also like to know just how near to stock was the Stutz machine used in the Milwaukee races. It seems to me

its performance was wonderful, considering its horsepower, with that of the winner. Was it geared higher than stock, any special transmission, motor, etc.?—Byron S. Potter.

1—The Kellogg pump will serve very well for this purpose. The distributor may be mounted on the same shaft that drives the pump. The acetylene piping would not serve as air leads. In starting on acetylene, the pressure is low and the volume of gas to be transmitted is small. On the other hand in the compressed air system the volume of air is considerable and a pressure of from 30 to 90 pounds is usually employed. The same applies to the engine valves used by the gas system.

2—The following manufacturers manufacture pneumatic engine starters:

Kellogg Manufacturing Co., 1 Circle St., Rochester, N. Y.

Crescent Air System Co., Ford Bldg., Detroit.

Lipman Mfg. Co., 211 Pleasant St., Beloit, Wis.

Janny-Steinmetz Co., Philadelphia, Pa.

Lombard Mfg. Co., 30 S. Water St., Rochester, N. Y.

Roth-Murphy Co., Lemke Bldg., Indianapolis.

Start-Lite Co., 1502 Michigan Ave., Chicago.

Wilson Motor Starter Co., Franklin, Pa.

3—The wheelbase, wheels, pressure system and the pistons and connecting rods are claimed to be the only non-stock portions of the chassis of the Stutzes that competed at Milwaukee. Of course the gear ratio was higher than stock, but inasmuch as the rear axle was stock and permitted of these changes, according to the A. A. A. rules this would not prevent it from being considered a stock chassis in this respect. Of course the wheelbase and wheel changes ruled it out of the strictly stock chassis category. The gear-set and motor other than the changes cited above, are claimed to be stock.

Delco System Explained

Splitdorf Synchronous Ignition and Unit Electric Starting, Lighting and Ignition Outfit

ALBANY, N. Y.—Editor Motor Age—I would like an explanation with diagram showing the internal connections of the Delco system, in which both the battery and magneto currents may be traced.

2—I would like the same information in regard to the Splitdorf two-point ignition system.

3—I would like to know the formulae for body polish as used by the manufacturers of the Thomas, Pierce-Arrow, and Peerless cars.—John Bastian.

1—The Delco system consists of a motor-generator, a controller and a storage battery, which furnish current for the ignition, illumination, and starting of the engine of a motor car. The first function is accomplished by taking the current from the controller as a primary current, and inducing a high-tension current with it in a single-unit induction coil, which high-tension current is distributed to the spark plugs of the engine by a gear-driven distributor, included in the generator group. The second function is accomplished by taking current from the controller at 6 volts, and conducting it through a lighting switch to the individual sets of lamps, in parallel.

The third is accomplished by switching the current from the battery back through the generator, in a series winding, distinct from the multiple winding employed in charging. The generator is carried as an accessory to the engine, being gear-driven

EDITOR'S NOTE—To the readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department, not necessarily for publication but as an evidence of good faith. Motor Age will not publish communications where this rule is not lived up to.

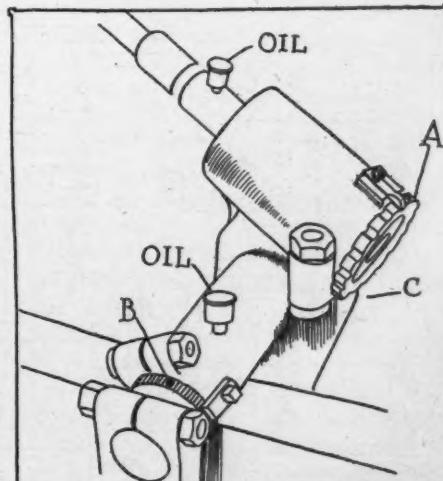


FIG. 4—POINTS OF ADJUSTMENT ON MAXWELL STEERING-GEAR, SHOWING OILING POINTS

positively by it. The battery is carried, with the controller and an ampere-hour meter, in a box on the running-board of the car. The controller is operated by the clutch pedal, while the lighting switch and the switch end of the ignition coil are carried on the dash.

The generator is a compound-wound dynamotor, whose fields are in two sets, multiple-wound for charging the battery, and series-wound for use as a motor in cranking. The same armature is used for both purposes. There are two sets of gearing to the motor, one of which is direct from the timing gears as a generator drive, and the other, a reduction gear to the toothed flywheel of the engine, for use as a motor in starting. The controller consists of a number of switches, so arranged that at one position, the battery is wired to the series winding of the generator, converting it into a motor, and in the other, in multiple to the four sets of cells, of which the battery is composed, to the multiple winding of the generator, for charging. A differentially-wound automatic cutout breaks the charging circuit upon the speed of the motor falling so low that the current flows back from the battery to the generator armature, thus preventing exhaustion of the battery.

The battery consists of twelve cells, arranged in groups of three, of 6 volts each. These sets are normally wired in multiple to the generator, which charges them at 6 volts, and to the ignition and lighting system, to which the battery discharges at the same pressure. In starting, however, the battery current is taken in series, at 24 volts. The capacity of the battery at 6 volts is 80 ampere-hours, while at 24 volts it is 20.

In starting, the clutch-pedal is pushed out, with the spark retarded. This operation meshes the reduction gears of the generator-motor with the toothed flywheel, and moves the controller to the position

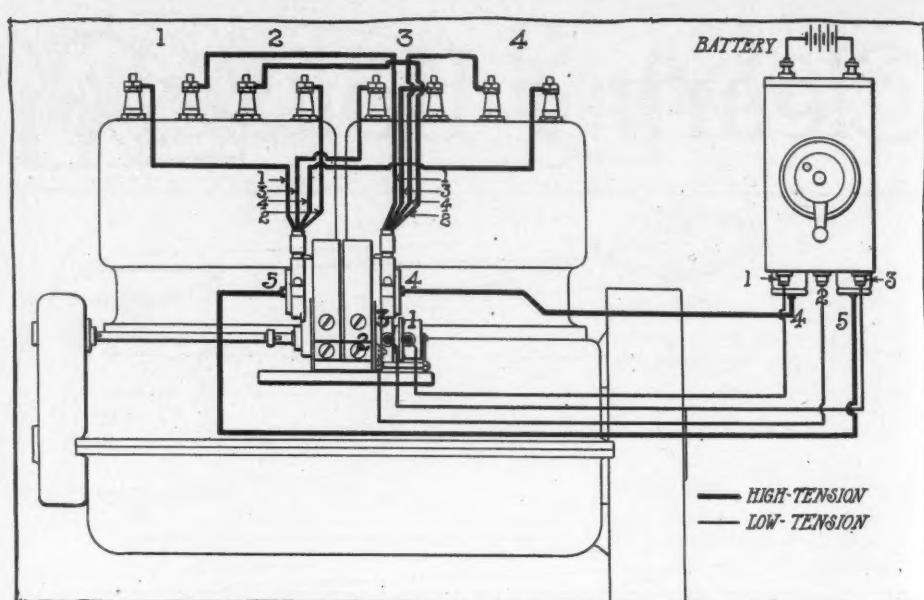


FIG. 5—SPLITDORF DOUBLE SPARK MAGNETO WIRING DIAGRAM

wherein all cells of the battery are wired in series to the series winding of the dynamo, at the same time operating the starting clutch, which locks the starting mechanism fast to the clutch pedal. When the engine responds, the spark is advanced, and the pedal released, whereupon the controller is shifted to its normal position again, so that the battery is wired to the generator and outlet wires in quadruple series-multiple, the output being in the form of a 6-volt 80 ampere current. The 1913 Delco has embodied several changes in this arrangement, which will be described in Motor Age in the near future. The present Deleo system is shown complete in Fig. 6.

—The Splitdorf synchronous two-spark system is shown in Fig. 5. This consists of the usual dual magneto and battery ignition system, with the addition of a second high-tension distributor on the magneto. The wiring to the dash coil, is by two low-tension

wires, a primary ground and primary wire to conduct the battery primary to the magneto-breaker; a wire to the battery; another to the engine ground; and two high-tension wires, from the magneto-breaker to the distributors. In addition to these another low-tension wire leads from the primary on the magneto through the dash switch to the ground wire, for the purpose of grounding the primary circuit in stopping to prevent burning out the magneto armature.

—For many years the Peerless company has used no body polish, either at the factory or its branches. The cars are washed and cleaned in a full stream of slow-running water, without the use of any soap, chemical, or cloth. When the dirt is removed, and the varnish is exposed, it is dried and polished with chamois. If the surface is scratched it is rubbed down and refinished with finishing varnish.

The Pierce-Arrow company uses three formulae. The first, for warm weather, consists of equal parts of raw oil and water. The second, for the removal of oil and tar, such as is thrown up from freshly-treated roads, consists of two parts of raw oil, one part of coal oil, and one part of water. The third, for well-seasoned varnish, and winter use, consists of two parts of white vinegar, and four parts of cotton-seed or sweet oil. After polishing, a clean cloth, damped with alcohol is used to remove any grease that may remain. The Thomas is no longer in business.

ADJUSTMENTS ON MAXWELL

—Stromsburg, Nebr.—Editor Motor Age—I would like directions for adjusting the steering gear on a 1912 Maxwell Mascotte.

2. How can I stop the noise of the driving gears in the rear axle. It makes a very disagreeable noise when running about 10 miles an hour, yet I believe the bearings are all right.—Reader.

1. There are three adjustments on this steering gear. The first, A, in Fig. 4, is a large nut which when turned to the

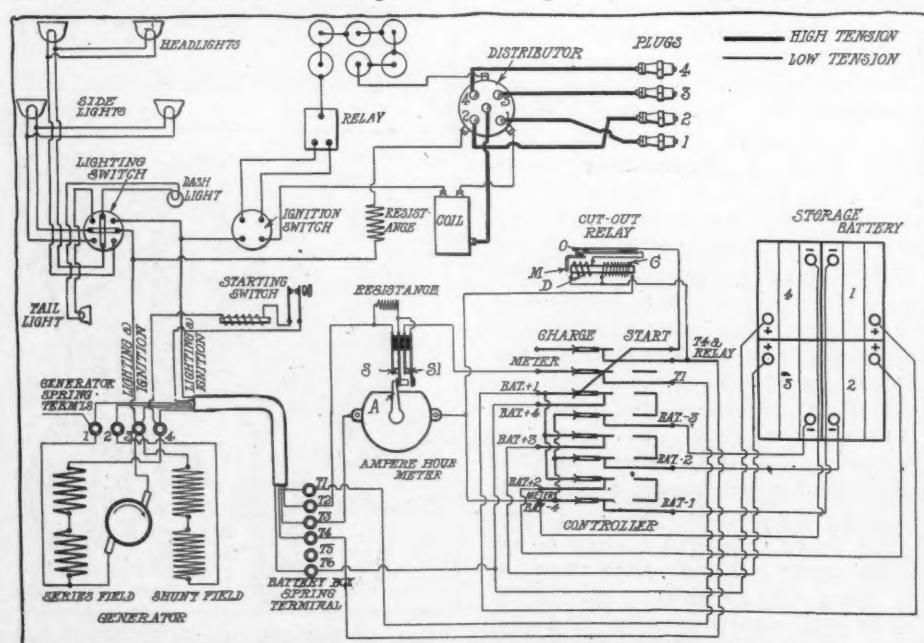


FIG. 6—PLAN OF COMPLETE 1912 DELCO SYSTEM

right takes up on the thrust bearing of the main steering pillar. This nut is castellated and locked by means of the small finger shown. This finger is loosened or tightened, to be slid forward or back, by means of the set screw on top. The second adjustment is on the sector shaft. This consists of an eccentric bushing which is turned by means of nut B, in the figure, for the purpose of bringing the sector closer to the worm. This is likewise secured by a locking finger, engaging knurls on the nut. The nut is turned by the aid of a punch, in the hole which appears at the top. The third adjustment is for end-play on the sector shaft and is located on the inner end of the shaft, as indicated by the arrow, C.

3. I would also like to know just how by means of adjustment, the usual recourse being the substitution of a new driving pinion. The adjustment is in the form of the usual nut at the front of the housing, which takes up the thrust on the drive-shaft. To replace the driving pinion requires the removal of the shaft from the housing, although the rear axle proper need not be disturbed. This is a 3-hour job, and the new pinion will cost you \$7.

HORSEPOWER FORMULAE

Hoosac, N. Y.—Editor Motor Age—Kindly publish some horsepower formulas, both American and foreign.—L. S. A.

The standard horsepower formula of the world is the S. A. E. formula, which originated with the Association of Licensed Automobile Manufacturers, of which the Society of Automobile Engineers is the outgrowth. This formula is based on that of the Royal Automobile Club of Great Britain. The S. A. E. formula is:

$$H. P. = D^2 N$$

2.5

In which D=Diameter of cylinder in inches,

and N=Number of cylinders, at an assumed piston speed of 1,000 feet per minute.

The British form has been modified to $4 D^2 N$, and was recently supplanted by $0.464 n(D + L)(D - 1.18)$ after laboratory tests.

A great deal of dissatisfaction with this formula has been found in both America and Europe. Since the popularity of the long stroke has become so great, it has been found that while, to a limited extent the S. A. E. formula takes stroke into account, the results are not accurate as applied to this form of motor. The following formula has frequently been suggested as a substitute that would give the same results as the S. A. E. in motors of short stroke, but which would give due allowance for the increased power for a given bore to be found in the long-stroke motor.

$$H. P. = D^2 S N R$$

12000

In which D=Diameter of the cylinder in inches,

S=Stroke in inches

N=Number of cylinders,

and R=Revolutions per minute.

The Institute of Automobile Engineers of England recently recommended the following rating as a basis for taxation, to supersede the R. A. C. formula:

$$H. P. = K D (AD S) N$$

In which D is the diameter of the cylinder in inches,

S is the stroke,

and N is the number of cylinders.

K and A have not been ascribed values. F. H. Royce, of Rolls-Royce, Ltd., of England, has suggested the following:

$$S \times N \times .2$$

$$H. P. =$$

$$(D(D-1) \times (D+2))$$

In which D=Diameter of the cylinder in inches,

S=Stroke in inches,

and N=Number of cylinders.

The Automobile Club of France adopted the formula below in 1906:

$$H. P. = 0.0028 D_2 \times N$$

This has been found quite satisfactory, as based on the standard formula, recognized on two continents, and differs only in that it has been amplified so that piston speed instead of being a constant is separated into its variable factors, stroke and crankshaft speed.

For two-cycle cars, the above formulas will, of course, be too conservative, as it is generally conceded that a well-designed two-cycle motor will give greater power for a given piston displacement than a four-cycle motor. The following two-cycle horsepower formula has been suggested:

$$H. P. = D^2 LRN$$

13,500

In which:

D is the diameter of the cylinder in inches,

L is the length of the stroke in inches,

R is the revolutions per minute,

And N is the number of cylinders.

CRADLE FOR CRIPPLED CARS

Streator, Ill.—Editor Motor Age—We wish to construct some sort of a truck for

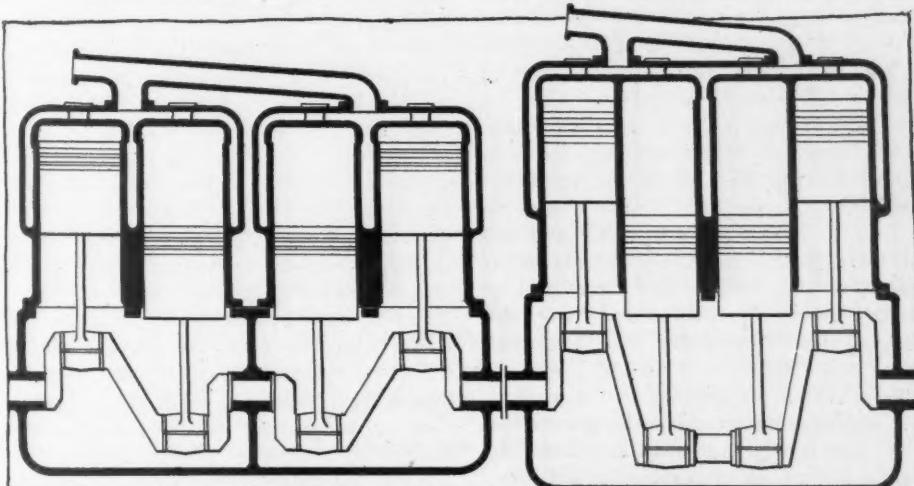


FIG. 7—STRUCTURAL ECONOMY OF LONG-STROKE MOTOR

In which D=Diameter of cylinder in inches,

and N=Number of cylinders.

The present French rating, as adopted by the Automobile Club of France, is the same as the former English rating, except that it is taken in millimeters instead of inches.

and n is the number of cylinders.

Motor Age, taking the calculations from square motors which formed the basis of the S. A. E. formula as accurate, has computed the following amplified rating, based on the standard formula, and which has been termed the modified S. A. E. rating:

$$D^2 N S R$$

$$H. P. =$$

15000

In which D is the diameter of the cylinder in inches,

N is the number of cylinders,

S is the stroke in inches,

and R is the revolutions per minute.

use in bringing in cars with broken rear axles, something which we could slip under the rear end so that they can be towed in. We would thank Motor Age or its readers for any suggestions that would help us out in designing such an article.—C. Stauber.

The design in Figs. 1 and 3 is of a cradle truck to be slipped under the rear of the car, constituting a truck for transportation, and a jack in one. The long tongue is slipped under the body and the adjustable chairs are raised as high as possible, and the front end of the tongue raised to the height of the front axle and tied or chained in place. The rope or chain that is used for this purpose should be secured to the tongue a little behind the front axle, so as to prevent the cradle slipping back. The car should be towed from the front spring-horns as usual. The wheels and axle of the truck may be taken from an old cultivator, or purchased from the repair stock of an implement manufacturer. The frame is secured beneath the axle to enable it to clear the low tanks found on many cars.

The Motor Car Repair Shop

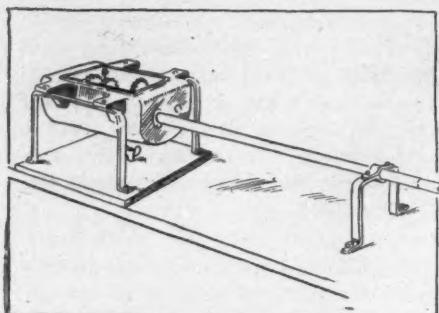


FIG. 1—CONVENIENT TRANSMISSION SUPPORT

Old Files Make Good Scrapers

AMONG the many homemade tools to be seen in many motor car repairshops there are perhaps but few that can be as easily made as a scraper for fitting crank-shaft bearings, etc. Old files make good scrapers, particularly old half round files such as shown at the top of Fig. 2, and to convert it into a scraper one has but to apply it to an emery wheel and grind off the teeth; then grind it into the form shown below in Fig. 2, or into any form desired or most useful in the work for which it is intended. If one wishes to hasten the operation of grinding and has the facilities for annealing and hardening the file, it can be annealed, then filed or ground or forged into shape, and the scraping part rehardened and tempered and ground sharp.

To anneal a file one has but to heat it to a uniform cherry red color, then allow it to cool slowly in the ashes beside the fire, in the air, or preferably in powdered lime. It must not be quenched in water. This process softens the metal so that it can be readily cut with another file or cutting tool, and more easily with an emery grinder; and it also may be bent cold to a certain limited extent, though it generally is advisable to make all bends while the file is red hot. After the file has been formed into a scraper in the annealed state it can be hardened and tempered by again heating it to a cherry red color, then holding it in a vertical position with the scraper part downward, immerse the whole of the scraper part into cool water and move about until it has lost its red color; at this point it should be withdrawn from the water and some smooth portion of it quickly cleaned off with sand paper or emery cloth so that the change of color as it cools may be seen. When it has taken on a light yellowish straw color, drop the whole file into the water and leave it there until it is entirely cool, when it will be found that the scraping portion is quite hard and ready to have a keen and durable cutting edge ground on it. A piece of metal cools

Old Files as Scrapers

most quickly if moved around in the water and in tempering it generally is necessary to cool the parts quickly.

Convenient Transmission Support

In order that the labor of one workman of a large repairshop might be facilitated, supports were provided for the transmission gearbox and the propeller shaft attached thereto as illustrated in Fig. 1. These supports render the handling of the gearcase so convenient that much difficulty and time would now be required to do the same work without them, and it is also claimed that much better workmanship is obtained through the use of such equipment. The gearbox is mounted on and secured to two band iron supports, which are in turn secured by studs to a heavy cast iron plate, and the plate is itself secured to the workbench by means of a bolt and thumbnut. The other little support, which is provided to form a bearing for the end of the propeller shaft, also is made of band iron and readily removable from the bench. By having this equipment quickly detachable it is possible to clear the bench for other operations. Such equipment costs but little. Often it can be made by the workmen at times when work in the shop is slack, while the material usually can be obtained from the scrap heap of one's own shop, or that of another. Anything in the way of equipment that will facilitate operations and make for better workmanship is to be recommended, especially when it can be obtained at a reasonable cost.

Rack for Rear-Axle Shafts

In Fig. 3 is shown a rack made from band iron about 1-inch wide and about $\frac{1}{4}$ -inch thick. It comprises a very easily made framework which is divided off into sections suitable for holding rear-axle shafts and the like in a convenient and

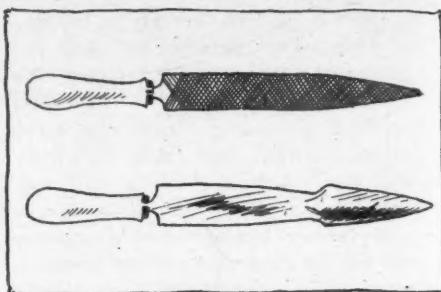


FIG. 2—TRANSFORMATION OF FILE INTO SCRAPER ILLUSTRATED

orderly fashion. It has been said that the acme of good order is to have a suitable place for everything and then keep everything in its place. Two of the advantages of this rack therefore are that it provides a place for these shafts while motor cars are dis-assembled for repairs, and in so doing makes it possible for the workmen to keep these features of the car in the place provided. In a word, it promotes order in the repairshop. There is another advantage in a structure of this kind, however, that is worth mentioning. It is a well known fact that shafts such as these and camshafts and crankshafts, etc., are very easily bent out of true by a slight jar such as might be received when one of these shafts happens to topple over, or be dropped, whilst a heavy crankshaft has been known to be sprung by simply securing one end of it in a vise without a support at the outer end. This makes it necessary to handle shafts of this character with great care when removed from their respective places on the car; and the use of suitable racks and supports for such shafts in the motor car repairshop is to be encouraged by every motorist and repairman.

Grinding Clutch Disks

Disk clutches if wrongly adjusted in the first place will start slipping, which movement very soon rubs away the lubricant between the rings, and the result is a continual grating until the clutch locks and takes up the drive solidly. When plates get to this stage there is only one remedy and that is to replace them with new members or have the old ones ground.

In connection with this operation a new method of smoothing the plates has been brought out by an English concern, which uses a magnetic chuck on the grinding machine. These tools are admirably adapted for this work. Each of the thin rings is simply laid against the chuck and the electricity turned on, whereupon it is held firmly against the face of the plate, and there is not the least fear of its being in any way distorted. By this method the metal may be ground smooth on one side and then reversed.

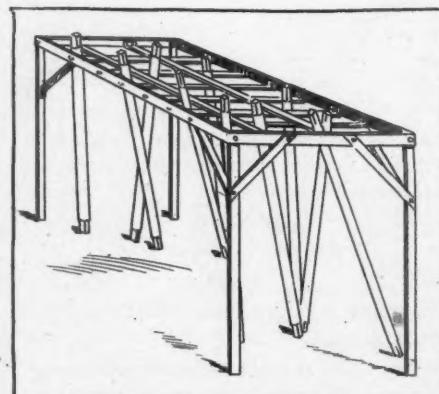
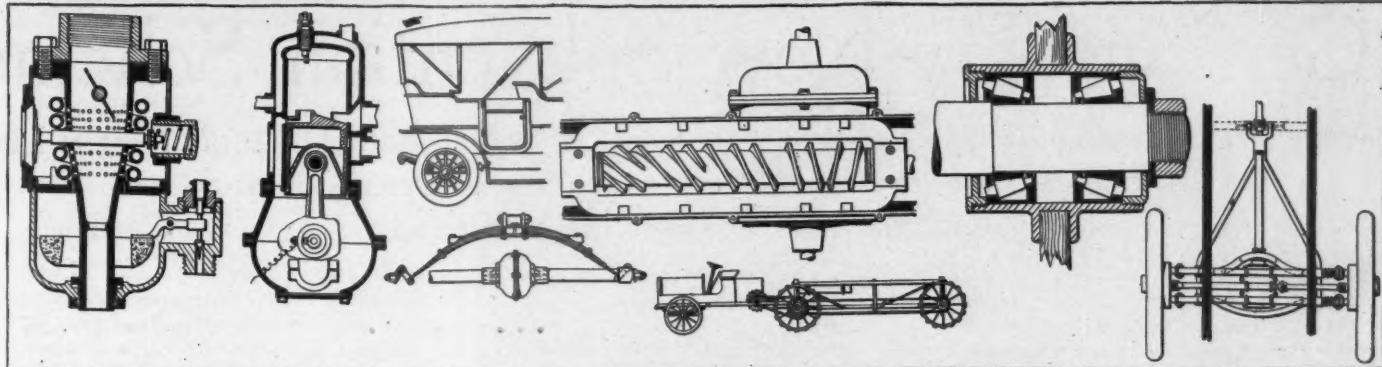


FIG. 3—HANDY RACK FOR REAR AXLE SHAFTS



Current Motor Car Patents



STEWART CARBURETER—WINTON ENGINE—PACKARD CURTAIN CARRIER—DRIESBOCH CHANGE-GEAR—CHRISTOPHERSON BEARING—HUPMOBILE SPRING—LINN TRACTOR—HILL-DRIVE SYSTEM

ROLLER Bearing—No. 1,045,814—To Herbert Christopherson, East Orange, N. J., assignor to New York Oilless Bearing Co., New York. Filed August 7, 1911, dated December 3, 1912. This bearing, while of the roller type, operates on a principle new to this type of bearing. The large diameter portion of the rollers bear upon opposing cones, while smaller-shouldered ends of the rollers bear on smallface ledges. Additional retaining ledges are provided to provide adjustment of the bearing, and to retain the rollers in proper position.

Packard Door Curtain Carrier—No. 1,045,861—To Allen Loomis, assignor, by mesne assignments to Packard Motor Car Co., Detroit, Mich. Filed November 6, 1908, dated December 3, 1912. To enable the side curtain of a motor car door to be carried by the door, independent of the top or its supports, so that it may be swung open or closed without having to disconnect the side curtain. This device consists of a frame provided with fasteners to be secured to the door.

Hupmobile Rear Spring—No. 1,046,273—To Kenneth Crittenden, Detroit, Mich. Filed July 12, 1910, dated December 3, 1912. This spring is of the transverse semi-elliptic type, secured at its middle to a cross member of a motor car frame, and at its extremities, by means of shackles to an extension lug on the brake drum flanges. The feature of this spring is that, owing to the fact that it is not situated directly above the axle, but a slight distance behind it, the distance between points of support on the chassis frame is lengthened, thereby increasing its ease of riding. This necessitates an allowance for the motion of the axle on the frame, which is provided for by mounting the middle of the rear frame on a swivel-bracket.

Stewart Pre-Heating Carbureter—No. 1,046,344—To John K. Stewart, Chicago. Filed July 27, 1911, dated December 5, 1912. To adapt it to the use of low-grade fuels, this carburetor, while of the usual

venturi-tube type, float fed, differs from others in that means is provided for the pre-heating of the auxiliary air. This is accomplished by air-jacketing the mixing tube and providing communication from the tube to the jacket by means of perforations in the walls of the tube. The auxiliary air valve is located in the walls of the jacket, and the air on being drawn in must pass through a coil of hot tubing. This tubing, preferably of copper, because of its thermal conductivity, is connected to a source of heated fluid, which may be the water in the cooling jackets of the motor, or the exhaust; supposedly the latter for use with low-grade fuels.

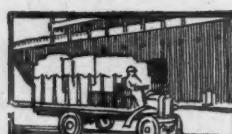
Tractor for Trucks—No. 1,045,992—To James W. Linn, Oregon City, Ore. Filed December 29, 1910, dated December 3, 1912. This patent relates to a power tractor with front steering wheels, a motor and rear driving wheels, the latter constituting the front axle and wheels of a load-carrying trailer. The trailer is provided with a rear axle and wheels, and is pivoted to the live front axle by means of a ball joint. This ball carries a swivel gear, to correspond to a gear on the rear axle, a chain carried by the two gears being provided to revolve the rear axle with the middle one, the swivelled ball and gear permitting the truck to swing on the forward driving axle.

Winton Two-Cycle Engine—No. 1,046,359—To Alexander Winton and Harold B. Anderson, Cleveland, Ohio, assignors to Winton Motor Carriage Co., Cleveland, Ohio. Filed April 2, 1908, dated December 3, 1912. Peculiar interest attaches to this motor because of the assignment to the manufacturer of a four-cycle car, but features are included that impart to it individual merit for consideration. The engine is of the two-cycle, three-port type with the intake port below the bottom of the piston stroke, and opened on the upstroke of the piston. Crankcase compression is used, the inlet being through a second port and exhaust through a third, the latter two being at the bottom of the

piston stroke, and uncovered on the downstroke of the piston. The feature of the construction of this motor is the form of inlet employed. Instead of the gas being admitted above the piston, and being deflected up one side of the cylinder by a deflector on the piston; the piston is provided with a passage, registering with the inlet port at the proper time. This passage opens into the cylinder through a vertical nozzle, being projected to the top of the cylinder, and on reaching the top of the compression or instroke, inclosing the spark plug in a body of prime gas. Ignition therefore takes place in a body of gas totally free from burned gases, promoting the rapid propagation of the flame, and efficiency of the motor.

Variable-Speed Transmission—No. 1,046,157—To Charles A. Dreisbach, New Haven, Conn. Filed October 11, 1911, dated December 3, 1912. To provide a gear-change for motor vehicles and the like, this device consists of a multiple worm drive mechanism, consisting of a worm-shaft carrying worms of different pitch, and at least one of reverse pitch, and a roller-sprocket, to engage the threads of the worm, thereby to be revolved. The worm-shaft is adapted to be slid to bring worm portions of different pitch selectively into mesh with the roller sprocket, and means to lock the worm in a given position.

Transverse Cardan Drive System—No. 1,046,388—To Louis A. Hill, Washington, D. C., assignor to Pneucar Co., Washington, D. C. Filed November 4, 1911, dated December 3, 1912. A live rear axle combination, this invention comprises a pair of wheels mounted on a dead axle frame, upon which is resiliently supported a differential and case, connecting with the engine by a cardan shaft, and with the road wheels by means of flexible drive axles. The body frame is in turn supported on the differential housing by means of an additional resilient element. This invention is more fully described on another page of this issue.



The Realm of The Commercial Car



Germans Try New Subvention Scheme

Army Trials of Motor Trucks Sees Plan Worked Out—Rear Axle Thrust on Tractors Limited to 5 1-2 Tons to Protect Roads and Bridges—Description of Some of Machines Tested in the Fatherland

THIS year's German military trials lasted throughout the month of October and comprised a round tour from Berlin through central and southern Germany to the extreme west of the country, and back to the starting point. The total distance covered was 2,068 kilometers, the average daily performance being 94 kilometers and the maximum performance 134 kilometers.

It will be remembered that the German army department in 1908 adopted a system of subsidies to be granted to the builders of load vans suitable for military uses. Whereas at first even the very heaviest motor cars were eligible, subventions from 1909 on were only granted to complete load trains of a minimum useful load of 6 tons. However, this figure was soon reduced and already in the following year regulations were issued in accordance with which the maximum weight of subsidised motor cars was not to exceed 9 tons, so that useful loads of 6 tons no longer were admissible. The trailers had to be 2 tons in maximum net weight, the maximum useful load being 3½ tons.

New Scheme Tried

A new departure has been made for the second 5 years' period of state subvention. According to the new regulation, the rear axle thrust of the tractor is to be limited to a maximum of 5½ tons, mainly with a view to enabling less substantial roads and bridges to be negotiated. This regulation of course entails a number of other limitations. The net weight of the tractor, inclusive of its full equipment, is not to exceed 4 tons, and the



STOERER MILITARY TRUCK

By Dr. A. Gradenwitz

total weight of the vehicle, inclusive of its equipment, its full load and a staff of two, is not to be above 8 tons.

While the loading length is thus limited to 3,600 millimeters, the minimum capacity of the car body is to be 6 cubic meters and its width, as formerly, 2,000 millimeters. The gauge has been limited to a maximum of 1,550 millimeters and the wheelbase to 4,500 millimeters. The net weight of the trailer is not to exceed 2 tons, as formerly, the maximum total weight being 5½ tons.

The car body of the trailer is to have a minimum capacity of 3 cubic meters, its outside length being about 3,500 millimeters. The minimum useful load of the trailer is 2 tons, and its maximum useful load 3½ tons.

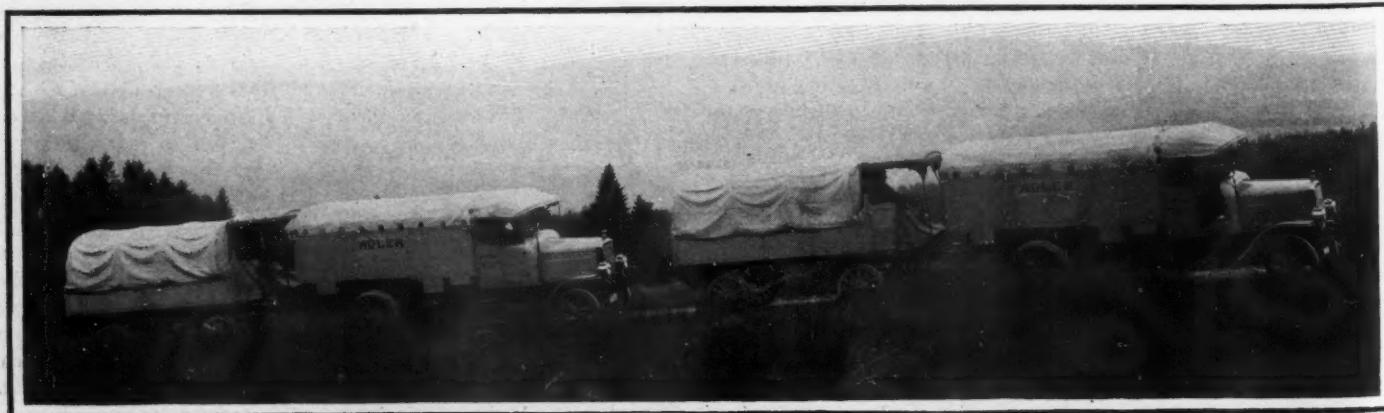
As regards the remaining regulations issued for the construction of subsidised load trains, the following are the more important:

Mechanical Features

The minimum output of the motor is to be 35 brake horsepower at normal numbers of turns. High-tension ignition is provided for and a hand-operated starter is to be arranged on the splash. The maximum speed of the train is to be 16 kilometers, the train negotiating on substantial roads any gradients up to 1 in 7, with its full load and equipment.

Another interesting condition is that a belt pulley made, if possible, in two parts, is to be mounted on a driving shaft rotating at the number of turns of the motor, so that the latter may as well be used for the operation of machines and machine tools. Means should be provided for braking the trailer by means of a continuous brake from the tractor, thus increasing the safety of operation. Other regulations are mainly calculated to standardize certain parts of the chassis and to make parts of different origin mutually interchangeable. The intention of prescribing a chain-drive for the rear wheels has been abandoned in view of the excellent results given by pinion-drive cars. As regards the construction of trailers, their clutches, brakes and wheels have been standardized.

This year's military trials comprised a round tour, from Berlin through the mountains of central Germany to the south and extreme west of the country, and back to Berlin. These trials were



ADLER TRAIN THAT PARTICIPATED IN GERMAN ARMY TRIALS

intended on one hand to test the vehicles constructed by the various firms in accordance with the new load train regulations, from the point of view of their military possibilities, and on the other hand to gain some experience for the design and operation of military load trains. The average daily performance was 93 kilometers and the conditions of the test were extremely exacting, each load train having to comply in every point with the new army regulations, each tractor carrying a useful load of 4 tons and each trailer 2 tons. The fuel was supplied at the expense of the firms by the experimental department of the German army. Each load train comprised a staff of two, a driver and a machinist, to whom is attached a military superintendent in whose presence the load train had to be got into working order and the fuel and cooling water to be replenished.

Nineteen load trains participated and the results were highly satisfactory to the car manufacturers.

Nacke Military Load Train

A distinctive feature of the Nacke load train, which in all essentials complied with the rules laid down by the German military department, are the gear brakes arranged at the side of the small chain wheels, so as to be most readily accessible and readjustable. The fore-wheel springs comprise additional springs. The radiator is connected elastically with the chassis. The motor is entirely inclosed, thus protecting all movable parts against dirt and moisture. The magneto-electrical igniter likewise is entirely inclosed in a watertight housing. In addition to the magneto-electric igniter, there is provided a special starting magnet by means of which the motor can be set moving from the side-board, as long as there is some ignitable mixture in the cylinder.

The gear comprises differential blocking, thus allowing both rear wheels to be driven at difficult points of the road and compensating the effect of the differential gear. Another special device prevents the rear position from being switched in as long as the sprag is lowered.

Adlerwerke's Military Load Train

The two load trains entered for this year's military trials by Adlerwerke of Frankfort-on-the-Main, compiled in their outside form and dimensions with the regulations issued by the army department, but of course showed some distinctive features as far as their details of construction are concerned.

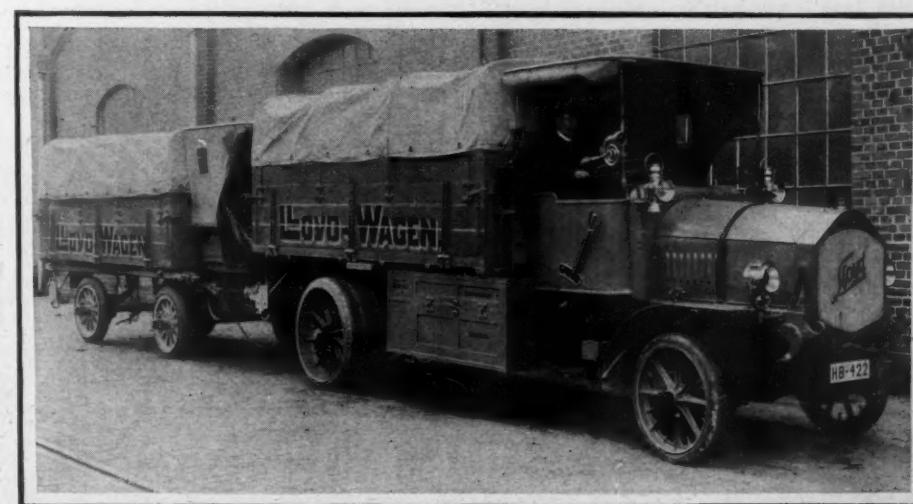
The chassis consists of compressed steel sheet girders. The motor is a slow-running four-cylinder motor, 114 millimeters in bore and 150 millimeters in stroke, its output being 35 horsepower at 900 revolutions per minute. The change-gear comprises four forward positions and one backward position and is combined with the motor housing, resting in its turn on an auxiliary frame located in three flex-



BÜSSING TRACTOR AND TRAILER



DAIMLER TRAIN ON THE ROAD



LLOYD TRACTOR AND TRAILER

ible bearings. This arrangement protects the motor and gear against any strain due to deformation of the chassis. From the change-gear the energy is transmitted by a cardan joint and cardan shaft to the chain bridge through the intermediary of

the usual bevelled-wheel drive and the differential gear.

The chain bridge is flexibly suspended by means of its housing from the two longitudinal girders and forms with the cardan shaft a rigid system likewise rest-

ing on three bearings. The small chain wheels are fitted to the outside end of the chain bridge shafts.

Lloyd Military Load Train

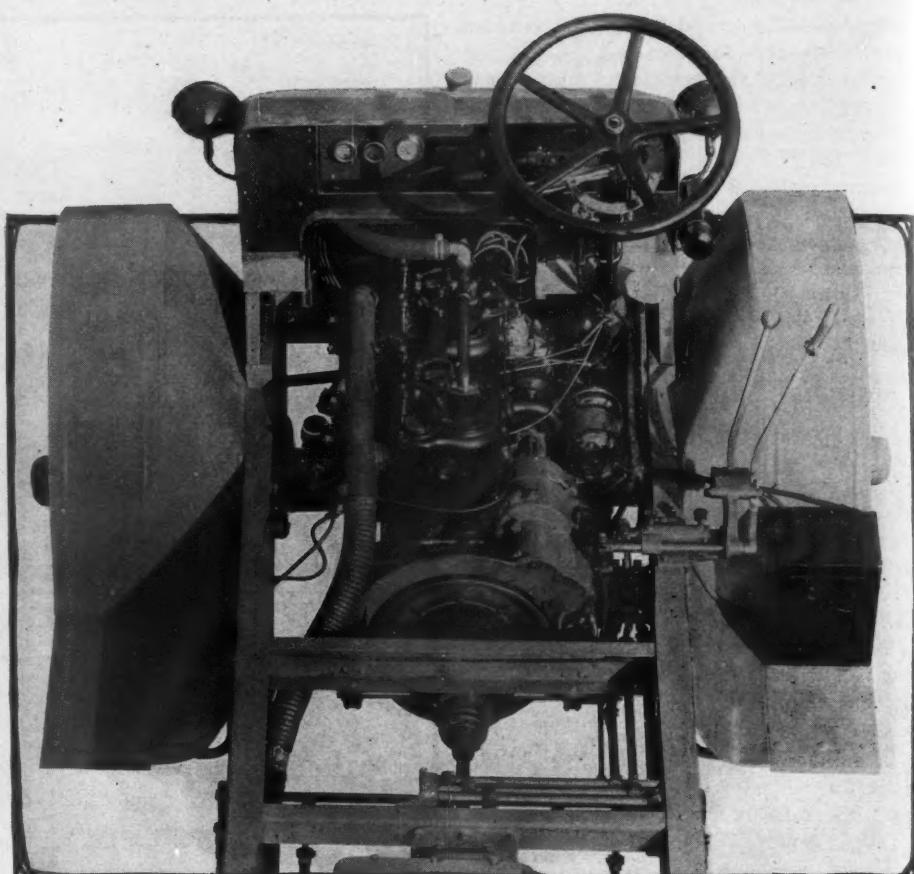
The Lloyd tractor generally corresponds with the design of the same firm's chain-driven passenger cars, the dimensions being of course those called for by the new army regulations. A resilient coupling device, responding both to traction and thrust, serves for coupling the tractor with the trailer. The latter corresponds in its design with ordinary horse-driven trucks having rotary jacks for steering. No special operator is required for steering the trailer, this being made by the coupling to follow the trail of the tractor in even the sharpest curves.

The motor shows the following distinctive features as compared with the previous type: All the valves are arranged on one side and are accordingly operated by a camshaft which, in its turn, is actuated from the crankshaft not by cog wheels—as previously—but by a silent Renault toothed chain. The carburetor and exhaust are likewise placed on the same side, thus obtaining extraordinarily short admission and discharge tubes and accordingly avoiding any noxious spaces. The fuel consumption per horsepower and hour has thus been reduced and the total output with a given cylinder diameter and stroke has been increased. The driving shafts of the magneto and the cooling water pump are arranged at right angles to the longitudinal axle of the motor and accordingly more accessible.

Büssing Load Train

Messrs H. Büssing, of Brunswick, entered two load trains of identical design and one motor bus. The tractors are fitted in the fore-part with double spring suspension and resilient draw-bar, while the motor bus also had a rear axle fitted with double springs. The cars have leather cone clutches, subdivided speed gear, chain drive and a differential gear designed for being stopped in position.

The tractor, inclusive of its full equipment, a useful load of 4 tons, and a staff of two, is 8,000 kilograms in weight; the effective axle thrust is 2,640 kilograms and 5,360 kilograms on the fore and rear axles, respectively. The car is 6,000 millimeters in maximum length, 1,980 millimeters in width and 2,750 millimeters in height, the volume of the car body being 5,830 cubic meters. The four-cylinder mo-



VIEW OF B. A. GRAMM MOTOR FROM TOP AND REAR, SHOWING DASH ARRANGEMENTS AND CONTROL LEVERS

tor has an indicated output of 38-40 horsepower at 950 revolutions per minute, the stroke being 150 millimeters and the cylinder diameter likewise 130 millimeters. High-tension Mea ignition and Mea starters are used.

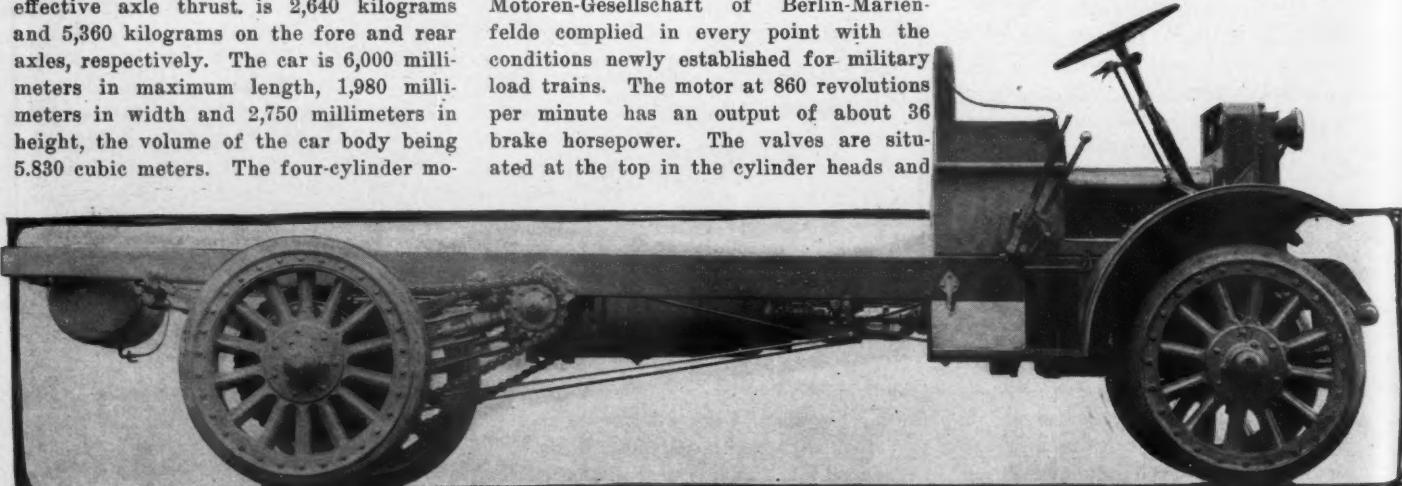
The trailer, inclusive of its full equipments, a useful load of 2 tons and a staff of one, is 3,975 kilograms in total weight, the effective axle thrusts being 1,975 kilograms and 2,000 kilograms on the fore and rear axles, respectively. The car is 5,400 millimeters in total length, 1,806 millimeters in width and 2,550 millimeters in height.

Daimler Load Train

The load train entered by the Daimler-Motoren-Gesellschaft of Berlin-Marienfelde complied in every point with the conditions newly established for military load trains. The motor at 860 revolutions per minute has an output of about 36 brake horsepower. The valves are situated at the top in the cylinder heads and

use the same camshaft, operated through toothed wheel transmission from the center of the crank shaft. Bosch high-tension igniters and hand-operated Bosch starters are used. The carburetor is of a patented design for heavy gasoline or benzol. Lubrication is effected automatically by an oil pump driven from the steering shaft. The radiator is a Mercedes honey-comb radiator, having behind it a ventilating fan. The flywheel has been designed as ventilator. On the driven shaft is fitted behind the clutch a belt pulley for driving any kind of machine or machine tool.

The rear wheels are driven in accordance with the familiar arrangement by means of a pinion and toothed rim.



SIDE VIEW OF 3 1/2-TON B. A. GRAMM TRUCK, SHOWING FEATURES OF CONSTRUCTION

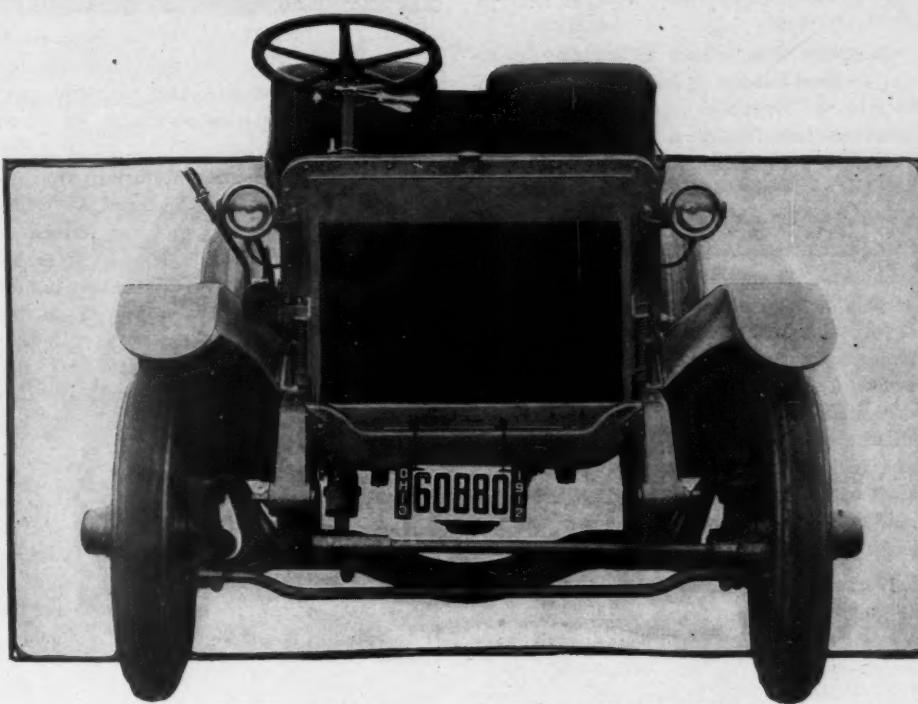
Gramm-Bernstein Truck in Two Models

THE first trucks manufactured by the Gramm-Bernstein Co. in its new plant at Lima, Ohio, have been delivered recently. At present two sizes are being constructed, a $3\frac{1}{2}$ -ton model and a 2-ton model. Both trucks are designed along the same lines, such allowances being made, of course, as are required by their difference in carrying capacity.

The motor in the $3\frac{1}{2}$ -ton truck is a Continental. It has a stroke of $5\frac{1}{2}$ inches and bore of $4\frac{1}{2}$ inches. It is of the four-cylinder, four-cycle type with the cylinders cast in pairs. The valves are all located on the left side of the motor and are inclosed to protect them from dirt. The lubrication is by splash and in addition to this there is a direct feed from two gear pumps to all the main bearings and the half time shaft. Water circulation is by means of a centrifugal pump, which is mounted on the right side of the motor base. The governor is of the vertical fly-ball type and will hold the speed of the motor below 1,000 revolutions per minute.

Gramm's Motor Suspension

The motor is supported upon a sub frame, which in turn is suspended by four coil springs from cross members of the main frame. These trucks are provided with a Gray & Davis two-instrument electric starting and lighting outfit. The electric generator is mounted on the motor sub-frame and is driven from the pump shaft by means of a silent chain. The electric motor is mounted upon the engine base and through a train of gears and an overrunning clutch connects with a gear mounted upon the flywheel. The electric generator furnishes current to a storage battery, which for starting duty furnishes current to the electric motor. After the



FRONT VIEW OF B. A. GRAMM $3\frac{1}{2}$ -TON TRUCK

motor is running the storage battery furnishes its current to an Atwater Kent unasparker.

The clutch is of the dry-plate multiple-disk type. There are seven large disks and six small ones. Driven from the clutch, the transmission is in a straight line through a propeller shaft and two Hartford universal joints. The transmission is of the selective type with the gears always in mesh. The different speeds are brought into action by engaging of hardened nickel steel dog clutches which have an ample face. The primary and secondary shafts are carried on radial ball bearings, while the shafts themselves are made

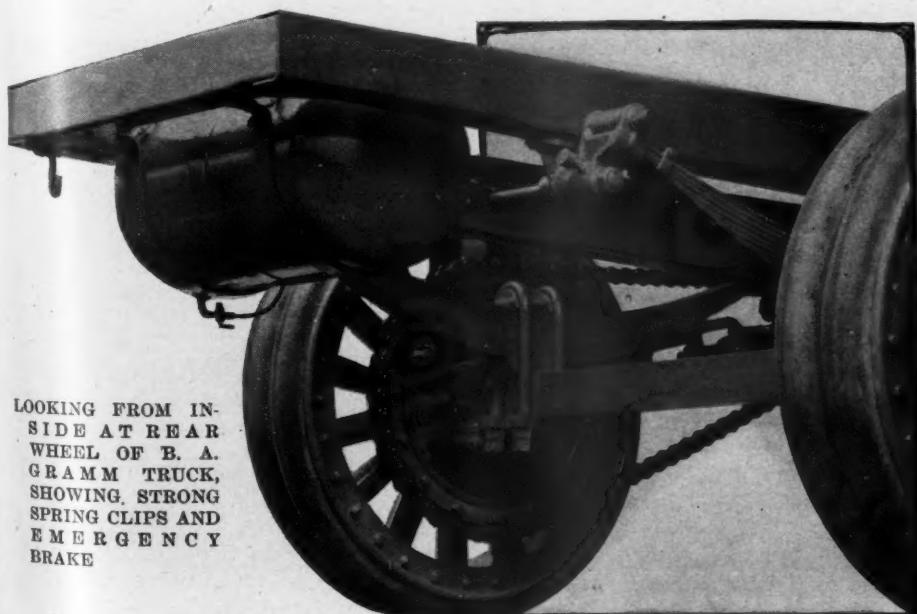
of nickel steel. The gears and the dogs on the primary shaft are not keyed in the ordinary manner, but a six-spline shaft is used. When not in operation the gears rotate on roller bearings. The construction of the transmission is such that on direct drive none of the gears is rotating; reducing the wear and tear as well as the noise. Four speeds forward and a reverse are provided.

Differential Construction

The differential is of the bevel gear type and is housed in the same case as the transmission. The entire case is carried on swivel joints which take up to a large extent the strains due to irregular roads. The jackshaft is of the floating type. It is supported from the main frame by large cast steel hangers which also carry the jackshaft sprockets. These sprockets are mounted on radial ball bearings. Drive from the jackshaft to the rear wheels is by means of two roller chains.

The frames are of pressed steel, are tapered at the ends and deepest in the center. Timken axles are used, both front and rear. Four brakes are provided. Internal expanding brakes, faced with raybestos, are used in the rear wheel hubs. The service brakes are external contracting and act on pressed steel drums mounted on the jackshaft inside of the frame.

The 2-ton model follows closely the lines of the $3\frac{1}{2}$ -ton in general construction. A three-speed forward and reverse transmission is used, but otherwise, except for size, there is little difference in the two models.



LOOKING FROM INSIDE AT REAR WHEEL OF B. A. GRAMM TRUCK, SHOWING STRONG SPRING CLIPS AND EMERGENCY BRAKE

NEW Club at Shenandoah—Iowans have formed the Automobile Club of Shenandoah, starting with fifty members. Henry Field is president and C. R. Babcock secretary.

Salvador Encourages Motoring—In order to increase the number of motor vehicles in the Republic of Salvador the government has issued a decree admitting cars free of duty for a limited time. Cars are being purchased by a large number of the wealthy families of the capital.

Massachusetts A. C. to Build—The Massachusetts Automobile Club of Boston has at last decided upon a new clubhouse. It is to be located at the corner of Clarendon and Stuart streets, which is near Copley square and just as convenient as the present clubhouse that has been outgrown. The new building will be six stories high and will cover a lot of 18,000 square feet and cost approximately about \$450,000. It will house 400 cars or twice as many as the present club.

Iowans Choose Road Officials—The River-to-River Association, which was the pioneer in Iowa for a cross-state road, held its annual meeting at Colfax last week. Lafe Young of Des Moines was re-elected president and B. N. Mills of Des Moines secretary. E. Delahoyde of Exira will continue as treasurer. The plans as outlined at the meeting will put the River-to-River road on the Ocean-to-Ocean map; secure state aid for good roads; establish complete system of pole marking and secure the services of a paid promoter or organizer.

Disbrow's 1912 Record—Louis Disbrow with his Simplex Zip entered 147 races during the year, which is said to be the greatest number of starts ever before credited to any one driver or car. Disbrow claims to have won every race in which he started. He covered 3,500 miles in events ranging from 1 to 200 miles. The car has been shipped twice across the continent and once from Toronto to Galveston, Texas. The total mileage traveled by rail is 40,000. Disbrow established thirteen track and road records which stand on the books of the American Automobile Association.

Good Roads an Old Issue—That good roads agitation, which has resulted in a most comprehensive scheme of highway improvement in Wisconsin, is by no means new is proven by an old election ticket dating back to 1861, found at Appleton, Wis., recently. The ballot was known as the Union Republican and the four candidates whose names were printed thereon were pledged to work for the improvement of public highways. It is interesting to note that the good roads faction defeated the antis by a large majority and that Outagamie county, of which Appleton is the seat, is today known as one of the most progressive in the direction of improving its highways in Wisconsin. It is also interesting to note that in the fall

election of 1912 the matter of good roads was an issue in several fights for member of the state assembly, and that the good roads representatives won out by large majorities.

Old Hunter Becomes Motorist—Howard Soule, of Syracuse, N. Y., aged 80 years, has become a motorist and has purchased a National roadster with a body after his own special design. He is an ardent hunter and fisherman and has provided in his new car places for two guns, space for all angling impedimenta, a collapsible tent, cooking outfit and compartments for extra supplies of oil and gasoline. He also has provided a snug compartment for the exclusive use of his hunting dog.

Indiana Talks Federation—There is a movement on foot to organize all of the motor car clubs in Indiana into a state organization. A meeting will be held in the rooms of the Hoosier Motor Club in Indianapolis on December 14, at which time a ways and means committee will be appointed to secure the formation of the state organization. An effort will be made to bring the clubs of Logansport, Indiana Harbor, Jeffersonville, South Bend, Fort Wayne, Kokomo, Salem, Munie, Terre Haute and Winchester into the organization.

Supreme Court Must Decide—Judge John H. Steele, of the district court, has decided to certify to the state supreme court at St. Paul the question of the constitutionality of the motor law of 1911 requiring drivers of cars to stop, return and give their addresses after accidents. Pending settlement of the question the trial of John W. Taylor, indicted for violating this state law, was postponed and the jury was dismissed. The attorney for the defendant attacked the law on the ground it required a defendant to give

testimony against himself in criminal action. The judge said that, while the purpose of the law is good, especially when accidents are so numerous, he would let the court pass on its constitutionality.

Bay State A. A. Banquet—The annual banquet of the Bay State A. A. of Boston is to take place next Monday night at the Copley Plaza hotel. F. D. Stidham has been appointed secretary of the organization.

Seattle Club Prospering—C. L. Morris was elected president of the Automobile Club of Seattle for the ensuing year at the annual meeting of the club. The other officers are: Joseph Blethen, vice-president; John Henry, treasurer; Frank M. Fretwell, secretary; O. B. Williams, R. P. Rice and A. Warren Gould, board of trustees. There is now a paid membership of 678 in the club and the treasury shows a balance of nearly \$5,000.

Mexican Road Race—The City of Mexico-Puebla road race is to be run on Christmas day. This will be the fourth annual running of this race, which will be from the City of Mexico to Puebla and return. The committee in charge of the event has decided not to divide the race into a contest beginning one day and finishing the next, but the round trip of the racing cars will be made in a single day. The cars will be divided into three classes, the same as last year. Class A is for cars of over 350 cubic inches cylinder capacity; class B for cars of between 230 and 350 cubic inches, and class C for cars of less than 230 cubic inches cylinder capacity. Class C will run only as far as Galpulapam and return, thus making the round trip for this class 160 kilometers, as compared with 320

Old Roads Made New



ROAD IN CAMDEN COUNTY, N. J., BEFORE IMPROVEMENT WAS MADE

Four Winds

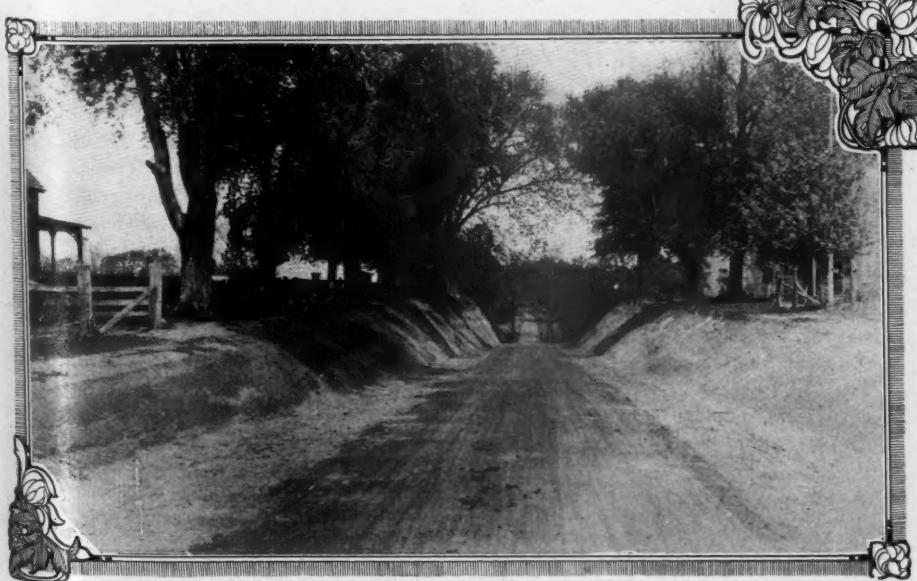
kilometers for classes A and B. Class C cars will be the last to leave Mexico and the first to return. The race is being arranged under the auspices of El Automovil en Mexico and El Imparcial.

After Uniform Laws—Davenport, Rock Island and Moline motorists have unanimously adopted a resolution favoring uniform traffic ordinances for the tri-cities. At the present time there is a different speed limit in all of the three cities, while there is also a dissimilarity in the ordinances governing car and other vehicles.

Physicians Win Their Case—The Boston physicians who protested to the Boston street commission against the ordinance that prevented them leaving their cars outside their residences or the places where they were on a professional visit have won their case, for last week the commission amended the ordinance, excepting not alone the doctors from its provisions but also extending it to the clergymen.

Tacoma Club's Progress—The first annual meeting of the Tacoma Automobile Club was held Tuesday, December 3. According to Secretary Sommers' report the club membership has grown from ten to over 350. More than \$700 has been spent by the club in keeping in repair the country roads and \$125 in placing signs marking the roads to Olympia and Portland. As the club was incorporated in June, 1912, the officers elected a year ago had a term of half a year to fill under the state laws. Therefore it was unanimously moved that the present officers be retained. The officers are: A. G. Prichard, president; R. B. Smith, vice-president; S.

No. 7—In New Jersey



SAME ROAD SHOWING WELL-GRADED EMBANKMENTS

M. Jackson, treasurer; A. L. Sommers, secretary. The four trustees are: M. T. Hartson, Henry Prince, E. G. Griggs and A. F. Albertson.

After Glidden Entries—An effort is being made to induce New Orleans residents who have cottages at northern summer resorts to make the trip as members of the Glidden tour next spring. There are several hundred persons in New Orleans owning cottages in the north and the novelty of making the trip through the country has appealed to many of them, who have promised the local promoters to join the tour.

On Fifth World's Tour—Albert Wyatt, of San Francisco, has started on his fifth tour around the world. The former trips were made on trains, steamers, mule and camel back, but the present one will be made in a 1913 30-horsepower Overland car, which will be carried on the decks of steamers and unloaded when a day is to be spent in port. Mr. Wyatt will thus visit Tahiti, New Zealand, Australia, Colombo, Egypt, the Holy Land, Turkey, Southern France, Germany, Russia, Siberia, China, Japan, the Philippines and Hawaii.

South Dakota a Bidder—South Dakota has made a bid for the 1913 tour of the Minnesota State Automobile Association. John D. Deets, who is attending the land show in Minneapolis, presented the request of South Dakota to Dr. C. E. Dutton, president of the association, suggesting that the route include the Black Hills district, which the association has not visited as yet. With the evident enthusiasm on the part of the people in that part of the state, Dr. Dutton is inclined to believe the idea is a good one and the route feasible. He told Mr. Deets that the decision would

depend on whether the A. A. A. tour goes south instead of west to Seattle, as has been suggested.

Fire Rigs Have Right of Way—Important by-laws have been adopted by the Montreal city council. One by-law provides that on the approach of any ambulance or fire apparatus answering calls, all vehicles, whether motor or otherwise, must immediately stop while the apparatus passes.

Leominster Club Elects Officers—The annual meeting of the Leominster Automobile Club, of Leominster, Mass., was held last week and the following officers were elected: A. Eugene Newton, president; George P. Jones, vice-president; Robert L. Carter, secretary-treasurer; Charles Harrison, John W. Pickering, R. B. Andrews and Edmund Hadley, directors.

Coral for Roads—Road-building in Louisiana may be revolutionized by the introduction of coral as a surfacing agent. A few hundred feet of roadway near Point-a-la-Hache was covered with this material a year ago when a ship discharged a portion of its ballast there. The excellence of this strip of road today is so apparent that arrangements are being made to bring coral from the Florida coast in large quantities. Coral is said to be superior to gravel.

May Cut Bath Off Maps—The route committee of the Maine Automobile Association, which lays out the motor routes in the Pine Tree state, threatens to cut Bath out of the list of places to visit on account of the poor ferry service across the Kennebec river at that point. The committee is to take the matter up with the Bath Merchants' Association and the city government before any radical step is taken, to give the people there a chance to have the service improved.

Mill Tax Voted On—Incomplete figures go to show that the state amendment for a maximum tax of 1 mill in Minnesota for good roads has passed. It is a hard matter to pass amendments in the state because voters often fail to vote on them, and a majority of the votes cast in the election is required. The good vote is believed to be due to the extraordinary efforts made to arouse interest in the amendment. Ramsey county, in which St. Paul is situated, gave the amendment a majority, but in Hennepin county, of which Minneapolis is the seat, more than half the voters failed to punch the buttons in the voting machines for any of the six amendments. This amendment will permit the state legislature next winter to order a 1-mill tax, or as much of it as it desires. The present law allows a $\frac{1}{4}$ -mill tax, but only in a few cases have the counties taken advantage of the maximum. Under the law each county must contribute as much as the state does for road improvements, and none of it can be spent in corporate limits. It is estimated that the 1-mill tax will not increase the cost to taxpayers for good roads.



OVERHEAD RUNWAY OF NEW REO SHIPPING AND ASSEMBLY PLANT CONNECTING THE MAIN PLANT



Among the Makers and Dealers



CHANGE of Name—The Republic Motors of Michigan has had its name changed to the Republic Motor Car Co. of Michigan.

Bringing Out Two-Cycle Motor—The Superior Motor Co., with a capitalization of \$100,000, has been organized to manufacture in Detroit a two-cycle motor which is said to do away with crankcase compression. The incorporators are Henry Fraser, G. C. Brimmer and W. C. Schneider.

Bright Has Controlling Interest—Controlling interest in the Hess-Bright Mfg. Co., Philadelphia, is held by President F. E. Bright and his associates. The D. W. F. people, who figured in the recent deal, purchased the stock of Henry Hess, who retired from the presidency, and now have a minority interest in the concern.

Reo Completes a New Plant—The new three-story 252 by 252 shipping and assembly plant of the Reo Motor Car Co., Lansing, Mich., was completed on December 2. This building increases the floor space of the Reo plant by 190,512 square feet and provides shipping and assembly accommodation for 1,600 motor cars. Its floors are cement. It is equipped throughout with the latest improved automatic sprinkling system. An overhead runway connects it with the main factory buildings, thus providing a convenient easement to and fro for all traffic. Its covered shipping platform cares for twenty 40-foot box cars at one time, giving a loading capacity of 120 cars per day or 3,120 per month of 26 working days. The building is situated directly on the Lake Shore railroad tracks the many advantages of which are ap-

parent for outgoing Reo shipments. The incoming freight is cared for on a separate track which runs direct to the main factory buildings. From present indications the 1913 Reo output will far exceed 30,000 cars.

Juno Elects Officers—The Juno Motor Truck Co., Juneau, Wis., formerly the Brodesser Motor Truck Co. of Milwaukee, at its annual meeting elected the following officers: President, Louis C. Pautsch; vice-president, Ferd Lindemann; secretary, Henry Henning; treasurer, Peter Peters. A substantial dividend was declared. Some additions and improvements are contemplated for the spring of next year.

Piggins May Move—The Piggins Motor Truck Co., Racine, Wis., manufacturing Piggins commercial vehicles, is considering several good propositions from commercial clubs and business men's organizations throughout the central west to move from Racine. Unless local capital makes inducements, it is believed likely the Piggins company will entertain invitations from other cities. Nothing definite will be done before the first of the new year, however.

Permit Granted Morgan & Wright—Permits have been issued to Morgan & Wright, Detroit, for the erection of sixteen new factory buildings to take care of a great increase in output of pneumatic tires. It is stated that when these additions have been completed about 5,000 tires will be turned out per day and the working force doubled. The new structure will vary in size from 2,000 to 121,000 square feet, the largest being 60 by 230 feet and six stories high. The new buildings will swell the

total Morgan & Wright floor space to over a million square feet and will make this plant the largest in the world, it is said. The Morgan & Wright factory is a subsidiary of the United States Tire Co.

May Make the Streamline—It is reported that a new car to be known as the Streamline will be brought out in Indianapolis soon by a party of capitalists whose names will not be disclosed for the present. The new car, it is understood, will be a 40-horsepower roadster with wire wheel equipment, 110-inch wheelbase, left-hand steer, center control, torpedo body and electric lights, and will sell at a medium price.

Will Fight Bankruptcy Suit—As stated in Motor Age last week, the Poss Motor Co. has signified its intention to contest the granting of the involuntary bankruptcy petition which was filed by the Detroit Foundry Co. and several other creditors in the United States district court at Detroit on November 19. Denial has been made by the concern and twenty-four of its creditors that its affairs are such as to make it bankrupt.

Elevator License Law Invalid—Milwaukee industrial men, particularly producers of motors, complete cars, commercial cars and parts for the motor industry, are gratified over the decision of the supreme court of Wisconsin holding the elevator license law, passed 18 months ago by the Social Democratic common council of Milwaukee, as unconstitutional. The law required every person who operated an elevator, freight or passenger, to obtain a license at the cost of \$1 per year or fraction

LUBRICATING MACHINES

LUBRICATING the hundreds of machines every type used in the manufacture of motor cars by the larger companies is no small task. In a shop with five or six lathes and a proportionate number of other tools, it is no great undertaking to keep them properly oiled. But in a gigantic machine shop, such as that of the Ford Motor Co., the distribution of oil, so that when needed, it will be accessible to every machine operator, is a different matter.

At the factory of the Ford Motor Co. there is a complete pipe line oil system, forming a network of oil distributing channels throughout the more than 28 acres of floor space in the factory. This oil system receives its supply of oil from three 10,000-gallon tanks sunk just outside the big machine shop. One of these tanks contains machine oil, another cutting oil and the third motor oil.

Dotting the machine shop are numerous oil taps. These taps are so regulated that after being turned on so that the oil is allowed to flow from them, but 1 gallon can pass through without the tap being turned on a second time. This prevents a careless employee from leaving a receptacle under a running tap and then going off and forgetting about it. Nearly 1,000 gallons of the three kinds of oil were used each day during this year when the factory built more than 75,000 cars. About 300 gallons of machine oil, 250 gallons of cutting oil and 300 gallons of motor was an average day's consumption. It is expected more than twice this amount will be used the coming year.

Practically all the machine and motor oil is consumed by the machines which they lubricate, but the cutting oil is filtered and used over several times. It is caught under the machines in pans and taken to a filtering device, where the small particles of metal are separated from it. Then it goes back to the machine and is used again. It can be used and cleansed several times before it finally wears out.

thereof. This was a blow to manufacturers, as their elevators were not in constant use and probably any one of fifty to 100 employees operated elevators when necessary. Under the ordinance, each of these men was required to have a license.

Sues Service Stockholders—Charles S. Reiman, Chicago, has brought suit in the circuit court at Wabash, Ind., against forty-nine stockholders of the Service Motor Truck Co. He asks \$50,000 damages because he was restrained from selling \$20,000 worth of stock in the plant. The restraining order has since been dissolved.

Whitesides Receiver Named—The affairs of the Whitesides Commercial Truck Co. have reached the Henry county circuit court, where Mark Davis has been appointed receiver for the company, which has a plant at Newcastle, Ind. The plant has been closed for some time and the receiver is to wind up and dispose of the business as rapidly as possible. The receivership proceedings were brought by

the stockholders, who have been unable to agree as to how the business should be conducted. The company was founded by V. M. Whitesides, who was general manager until he withdrew from the concern a few weeks ago.

LaCrosse a Bidder—The West Bend Aluminum Co., West Bend, Wis., is considering an offer from the Commercial Club of LaCrosse, Wis., to move to that city. The LaCrosse men offer the concern a three-story manufacturing building free of charge and electrical current for power drive at two-thirds of the cost charged at West Bend.

Duncan Given United Motors Job—Henry M. Duncan has been made supervisor of the eastern district of the United States Motor Co. in place of W. F. Smith, resigned. Mr. Duncan will have charge of the following selling companies: United Motor Atlanta Co., United Motor Syracuse Co., United Motor Washington Co., United Motor Pittsburgh Co. and the Keystone Automobile Co. of Pittsburgh. In addition to the supervision of these companies, Mr. Duncan will act as manager of the United Motor Philadelphia Co.

Studebaker Managers Meet—Branch managers of the Studebaker Corporation convened for the annual meeting in Detroit on December 4. Sales Manager E. R. Benson had the affair in charge, the entire direct selling force to the extent of about eighty being present. The formal program extended through December 6, during which time all phases of the concern's sales policy and publicity intentions were outlined to the assemblage. After an informal dinner at the Cadillac on Friday, the party left for South Bend.

Insuring Only Motor Cars—The first Wisconsin insurance company catering exclusively to owners of motor vehicles has just been organized at Juneau, Wis., under the style of Motor Vehicle Mutual Insurance Co. of Wisconsin. The headquarters of the company will be at Juneau, where offices have been established at the Citizens' Bank building. It is interesting to note that the principal figures in the new mutual insurance project are officers and moving spirits in the Juno Motor Truck Co. of Juneau, Wis. The Motor Vehicle Insurance Co. will engage in direct com-

SOFT SOAP FOR DRILLS

TO the average person it is news that soft soap enters at all into the process by which his car is built. Most remember soft soap as that home-made concoction that stood by the tub in the wood house back home on the farm with which during their adolescent years they were compelled to smear their features to the end that they might be presentable at table. Nowadays, however, soft soap has a far different use. In the machine shops of large motor car companies a mixture containing soft soap cools the drills and keeps them in shape to drill hundreds of holes each day and still do their work well.

In the machine shop of the Ford Motor Co. 500,000 pounds of white soft soap will be used in 1913. This soap will come in 1,000 barrels, containing 500 pounds to the barrel. Approximately 1,597 pounds is used each day. How is it used? The chemists of this company have perfected a formula containing hot water, soft soap and mineralized lard oil, which properly mixed is a most efficient lubricant for the drills. One man in the machine shop devotes his entire time to making the mixture for the drills.

When the lubricant is mixed it is pumped around through a pipe line system to the drill presses, drilling machines and lathes, of which in this huge machine shop there is no small number. At these machines the mixture is kept constantly flowing over the part being drilled, caught beneath the machine and used over again two or three times. When it is worn out it is carried away in the sewage system.

Great care must be used in selecting the right kind of soap for this mixture. Some brands cause the steel to soften, while others cause a scale to form over the steel. The mineralized lard oil used in the lubricating mixture by the Ford Motor Co. is made from a formula prepared by the chemists of the company. One barrel of about 50 gallons is consumed each working day.

petition with the stock companies, which are charging approximately 2 per cent for protection from fire and $\frac{1}{2}$ per cent for protection from theft. The mutual rates will be considerably lower, it is said, in fact, bearing the same relation to old line rates as do ordinary fire risk rates of the mutuals and old line companies.



PATHFINDER'S ARMORED ROADSTER WITH WIRE WHEELS

Development Briefs and Motor Novelties

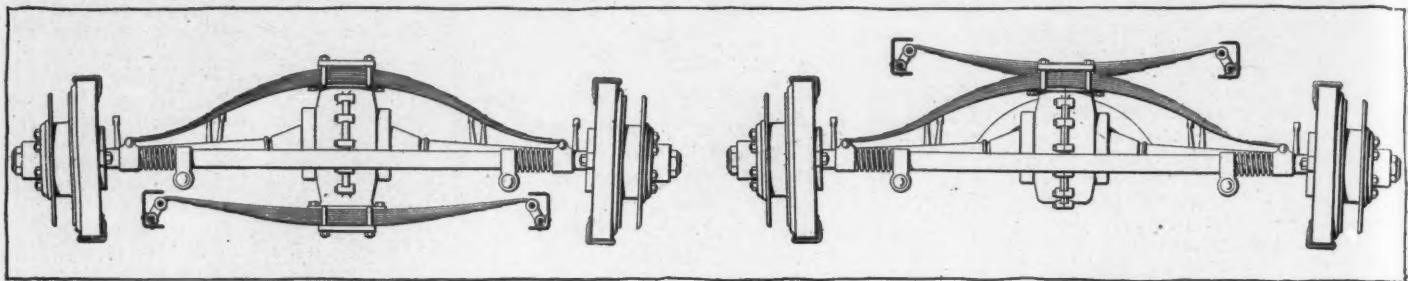


FIG. 1—REAR VIEW OF ULTIMATE-DRIVE AXLE AS ADAPTED TO UNDERSLUNG AND OVERHUNG SUSPENSION

NO inconsiderable number of engineers, while they bow to the popular demand, secretly favor the chain drive, arguing that whereas the chain and sprocket has faults, the destructive tendency of the unsprung weight of the differential and its housing is more to be avoided, owing to its destructive tendency to both the tires and the mechanism itself.

To avoid the faults of both types of axles, Louis A. Hill, Washington, D. C., has constructed a live shaft-driven rear axle that he asserts embodies the commendable features of both the chain and the shaft drive forms of drive axles, with the faults of neither, and in addition, features not found in any previous design. This axle he has called the Ultimate drive axle, in testimony of his hopes for its future. The axle consists of a light tubular dead axle, and a jackshaft, driving the wheels through flexible shafts direct instead of through chains and sprockets, and which is mounted direct on the axle itself instead of on the body. Unlike the ordinary type of floating rear axle, however, the drive member has no connection to the dead, or load portion of the axle, except through a pair of transverse half-elliptic springs.

In construction the Ultimate drive axle is composed of two units, one sprung upon

Ultimate Drive Axle

the other. These two are the dead axle, which is a double axle of tubular construction with an integral torsion member which extends in a triangle to a ball joint on the propeller shaft yoke. This axle carries the wheels and their bearings, and takes all driving torque and propulsion. The other is the live or driving axle, which consists of a bevel-gear-driven differential and housing, which drives two driving shafts, through universal joints, and is itself driven by an encased cardan shaft. The wheels are driven by the drive-shafts through universal joints disposed in an outer projection of the hubs. The differential housing is mounted on the dead axle by means of a pair of half-elliptic springs which are yoked to the dead axle members on sliding rings, which are fitted with compensating springs, being unshackled. These compensating springs resist the upward motion or rebound of the springs, and thus tend to keep the driving axles always in line with the wheels, yet permitting the springs to absorb all serious shocks and vibration. The body is sprung to the differential housing by a single transverse spring above it for an overhung frame, and below it for an underslung

frame. The universal joints operate at very slight angles owing to the restricted limits of motion of the springs between the dead and live axle members, and to the distance between the universal joints. This obtains even on the roughest roads, as the differential is maintained within very close limits of action, being substantially the center of an X-spring, with the result that it receives only half the deflection of either the body or the axle. The result is that the differential always assumes a position that is practically a mean between the extremes of angularity of the body and dead axle. In other words, the motion of the differential is only half that of either the body or dead axle. The total deflection of both shaft and axle joints is no more than with the shaft joints alone with a solid live axle, hence the angularity of each is less. The universal joints are 28 inches apart or half the wheel tread, the inner joints are situated within the differential housing, and the outer ones in the hub caps, the hub spindles being in the form of hollow cups, through which the shafts are free to oscillate.

The axle is floating in the truest sense of the word, as the differential element has no other function than the transmitting of the driving torque, and receives road shocks only through the springs. The

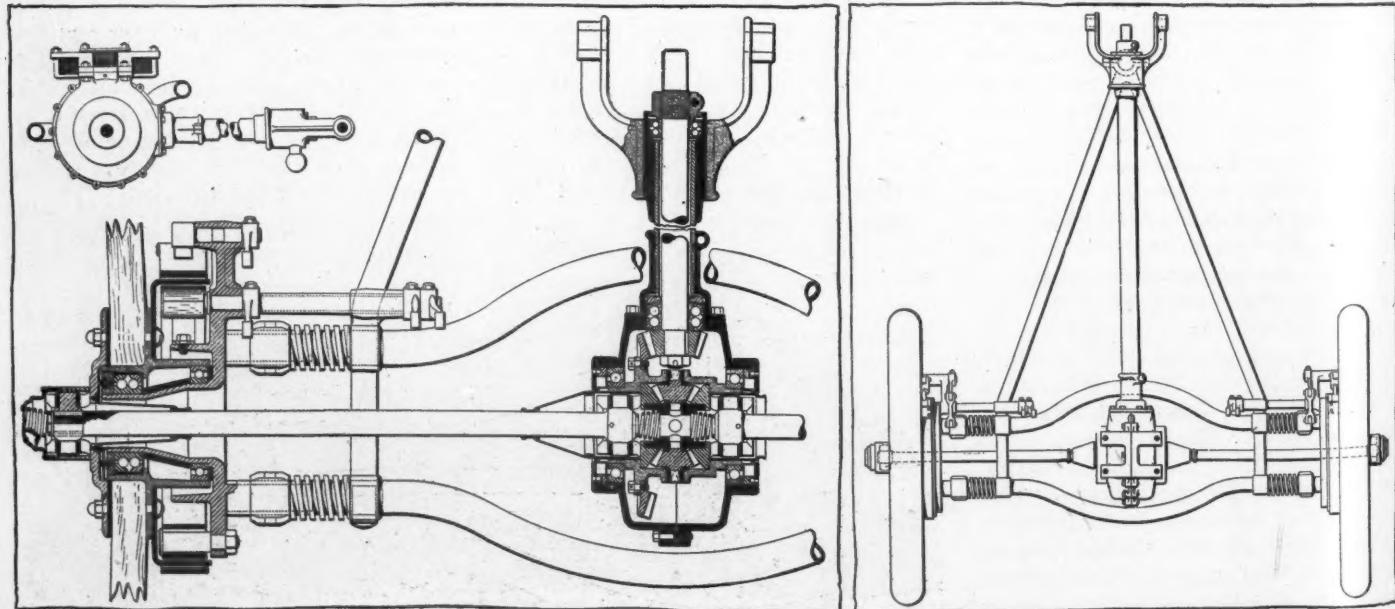


FIG. 2—SECTIONAL VIEWS SHOWING UNIVERSAL JOINTS

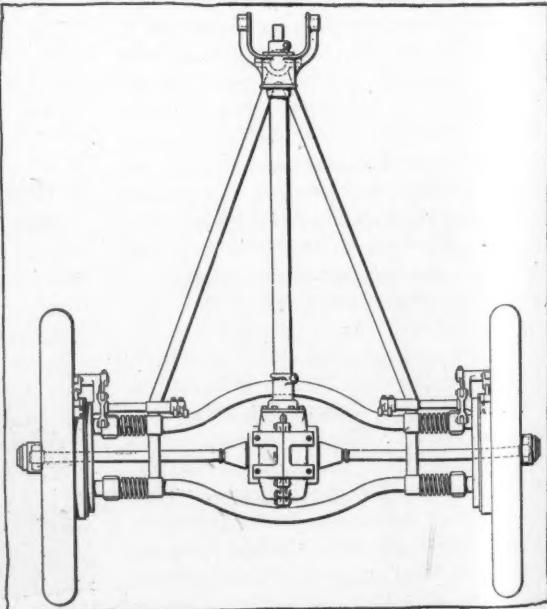


FIG. 3—GENERAL LAYOUT OF PARTS



FIG. 4—SEDAN COUPE BUILT BY ROBBINS

weight of this member, and through it, that of the body, is supported by the dead axle near its extremities, which permits of the light tubular construction of this member.

The axle may be assembled or taken apart with great facility, the removal of four bolts, two at the yoke, and the two that attach the body spring to the frame, permitting the entire unit, consisting of the rear wheels, axle, differential, driveshaft, and springs, to be removed as a unit. To do this, it is of course necessary to jack up the car by the frame.

The universal joints in the rear axle drive permit the wheels to be dished and correspondingly cambered. The wheels are of detachable construction, with demountable rims. The brake linkage is inside the frame, so that the pull-rods are all in a plane. Referring to Fig. 3 is shown the plan view of the assembly, and in Fig. 2 are shown sections of the axle. In Fig. 1 is shown a rear view of two styles of spring construction, for overhung and underslung frames, respectively.

The advantages of this construction, as advanced by the designer, are: That the weight of the whole device is reduced; that all unsprung dead weight is removed from the axle, saving both the machinery and the tires; that the ease of riding of

the car is increased, because of the two-stage spring suspension; and yet that the silence, efficiency and cleanliness of the shaft drive is all retained.

Robbins Coupe Body

In Fig. 4 is shown an English-looking four-passenger coupe body made by Irvin Robbins & Co., Indianapolis, Ind. It is of the popular extension design with a well carried out streamline stern, and is built for the Stutz. This streamline stern is accomplished by rounding off the edges and corners of the after quarters of the body, curving the back part of the rear window-frames to harmonize. The forward portion of the body is given a graceful curve, formed by a small sun-cowl over the windshield, gently merging into the front pillar with a suggestion of a forward sweep at the bottom. A deep cowl-dash joins the somewhat wide front of the body to the hood with as little break as possible.

The door is carried well back at about the center of the side wall of the car. The rear mudguard has been especially adapted to this body, following its contour, and meeting it flush. The lines of the body are laid out with the elegance of simplicity, the severity being toned by a simple white belt extending about the middle in one continuous ribbon from the front on one side up and around the rear quarters, and to the front of the opposite side. Below this is the single panel from front on one side to the other side, broken only by a narrow moulding on the door. Above, the walls are of glass. Flush lights, with dash ventilators, are let into the dash, being supplemented by colonial side lamps carried high on the front body pillar.

Boyer Suspension Bearings

The Boyer suspension bearing was designed to enable a ball bearing to sustain loads equal to those roller bearings are capable of supporting safely, with no more friction than the ball type. The principle of these bearings, as may be seen by reference to Fig. 7, is entirely different from that employed heretofore. The bearings do not take their load in a direction perpendicular to the axis of the bearing, but obliquely. Thus the load is taken by all of the balls, instead of only those on the bottom of the race. This gives about five times the bearing surface of other ball bearings, or with the same size and number of balls, one-fifth the strain on each. Instead of having a steel raceway encircling the balls with a companion raceway within the balls in the suspension bearing have been placed between two facing raceways of the same diameter, one of which supports the shaft and is supported by the balls, and the other of which in turn supports the balls and is supported by the mounting of the bearing. The balls are thus axially rotated and annularly revolved on an inclined axis, like the earth. This inclined axis of rotation adapts the bearing to withstand

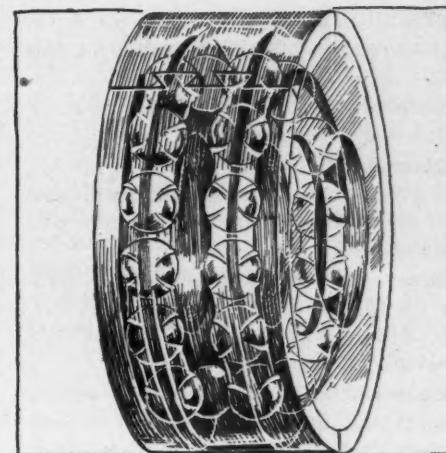


FIG. 6—PHANTOM OF BOYER BEARINGS

thrust as well as radial loads. The races have been cut so as to allow the balls but two points of contact at any one time, thus providing a true rolling contact, which it is said heretofore other ball bearings have not had.

The illustration Fig. 6 shows the double-race type of bearing. Single-race types are also made, in both ball and roller types. The ball bearings are given the preference by the manufacturers over the roller type for all applications except where great loads must be sustained by relatively small bearings. Single-row ball bearings are made in bore sizes from .3937-inch to 3.149262 inches, and the double-row type from .3937-inch to 4.33072 inches.

Lindsay Universal Felloe-Band

T. J. Lindsay, Indianapolis, Ind., proposes to equip wire wheels with a universal hub, to adapt them to application to the spindles used for wood wheels, and a universal felloe band to permit any standard demountable or Q-D rim to be fitted. The details of the former have not as yet been given out, but the latter consists of a wood felloe, encased by a steel armor, which secures the spokes, and through which a bolt and locking nut of the usual type passes, which in combination with two bevelled rim-base members, adapts it to receive any standard demountable rim.

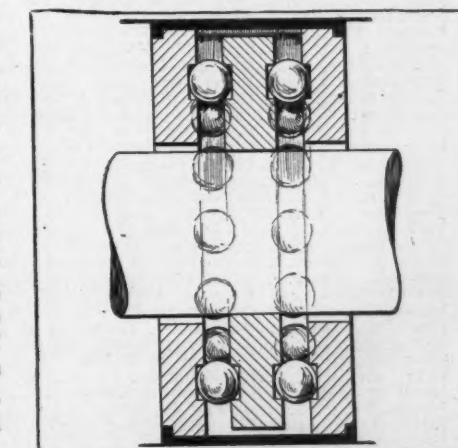


FIG. 7—SECTION OF SUSPENSION BALL BEARING

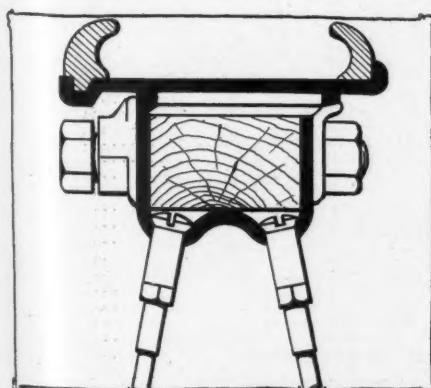


FIG. 5—LINDSAY FELLOE BAND FOR WIRE WHEELS.

PEMBROKE, Ont.—Thomas Pink & Co. are going to build a garage in this city.

Enderby, B. C.—E. J. Mack and H. G. Mann are opening a garage here.

Toronto, Ont.—The Standard Motors, Ltd., 107 to 203 Victoria street, will handle the Mitchell car for Toronto and vicinity.

Minneapolis, Minn.—The Republic Rubber Co. will have a home in the new Murphy building at Thirteenth street and Hennepin avenue.

Philadelphia, Pa.—A new sales, service and garage building for the Universal Motor Truck Co. is in course of construction at 1717-1721 North Twenty-second street.

Indianapolis, Ind.—A new garage has been opened at 23 McLean place, Indianapolis, by A. L. Duggan, who for the last 3 years has been identified with the Twenty-second street garage in this city. Duggan expects to take steps to obtain some agencies.

Atlanta, Ga.—H. C. Whitney has been appointed manager of the Atlanta branch of the Locomobile Co. of America, the post formerly held by the late Frank P. Day, of Hartford, Conn. Mr. Whitney was for a long time connected with the American Locomotive Co., having general supervision of sales for the southern states.

Newcastle, Ind.—A motor car sales agency and garage will be conducted at Newcastle by the newly organized Rose City Auto Co., which has been incorporated with an authorized capitalization of \$10,000. The directors and principal stockholders are Frank E. Smith, general manager of the Newcastle Maxwell-Briscoe motor plant; Charles W. Mouch, William F. Byrket, Howard M. Van Matre, Gordon

Brief Business

Recent Incorporations in the Motor Industry

Akron, O.—Motor Starting Co., capital stock, \$25,000; to manufacture motors and deal in supplies; incorporators, R. A. Woods, M. Paul, A. M. Tschantz, E. W. Paul, C. L. Dinsmore.

Appleton, Wis.—Appleton Motor Car Co., capital stock, \$15,000; to deal in new and second-hand cars; incorporators, J. A. Schmit, J. A. Kronser, J. McCann.

Augusta, Me.—McTernan Rubber Mfg. Co., capital stock, \$1,000,000; incorporators, E. M. Leavitt, E. L. McLean.

Baton Rouge, La.—White Motor Car Co., capital stock, \$10,000; incorporators, S. A. Craig, G. A. Puryear, W. H. Hyde, E. S. Craig, E. E. Wood.

Bedford, O.—Bedford Supply Co., capital stock, \$10,000; to deal in motor cars and supplies; incorporators, F. B. Senter, F. H. Calvert, G. W. Show, N. C. Boyd, A. B. Condon.

Boston, Mass.—Motor Supply Shop, capital stock, \$25,000; incorporators, M. V. O'Neill, W. R. McDaniel.

Buffalo, N. Y.—Velle Motor Sales Co., capital stock, \$20,000; incorporators, E. F. Snyder, J. J. Finerty, G. Frank Sherwin.

Camden, N. J.—Geiger-Piersz Construction Co., capital stock, \$100,000; to sell improved wheels for motor cars; incorporators, J. C. Geiger, W. T. Piersz, A. M. Garrison.

Chicago—Parmelee Motor Livery and Garage Co., capital stock, \$10,000; incorporators, G. B. Van Norman, C. O. Parmelee, L. G. Doyle.

Chicago—A. W. Greiner Auto Sales Co., capital stock, \$25,000; trade in motor cars; incorporators, A. W. Greiner, M. Feinberg, C. E. Becker.

Chicago—Electric Vehicle Maintenance Co., capital stock, \$2,500; to repair electrics; incorporators, W. Knobloch, W. C. Russel, H. A. Tarantore.

Chicago—Illinois Tire Filler Co., capital stock, \$10,000; to manufacture and deal in motor car tires; incorporators, A. Jacobs, A. Perval, C. B. Stafford.

Chicago—Alton Automobile Co., capital stock, \$10,000; incorporators, H. F. Horstman, W. Winter, L. F. Winter.

Chicago—Storm Shield Mfg. Co., capital stock, \$100,000; to manufacture accessories; incorporators, R. E. Wighton, L. E. Street, N. P. Street.

Chicago—Grove Auto Truck Garage Co., capital stock, \$50,000; incorporators, T. E. McNeill, H. L. McCurdy, W. H. Neterer.

Cincinnati, O.—Citizens Auto Service Co., capital stock, \$7,000; to operate motor vehicles for service purposes; incorporators, W. H. Davis, F. W. Kelly, L. J. Hoppo, A. Putmar, J. Louis Kohl.

Cleveland, O.—Dayton Airless Tire Sales Co., capital stock, \$10,000; to deal in tires; incorporators, W. A. Carey, H. Krejci, F. W. Chandler, R. M. Edwards, M. Otter.

Columbus, O.—Bracken-Stauton Tire Co., capital stock, \$5,000; to deal in motor car and truck tires; incorporators, W. F. Bracken, M. B. Stauton, L. A. Stauton, L. A. Stauton, M. Bracken, T. E. Curtin.

Dayton, O.—Dayton Equipment Co., capital stock, \$10,000; to manufacture and deal in accessories; incorporators, H. Stoddard, G. L. Baker, G. J. Loomis, W. C. Smith, C. D. Heald.

Detroit, Mich.—Detroit Auto Heater Co., capital stock, \$2,000; to manufacture motor car heaters; incorporators, O. F. Zahn, E. L. Zahn, H. S. Durand.

Dover, Del.—Light Commercial Car Co., capital stock, \$100,000; incorporators, H. E. Latter, W. J. Maloney, N. P. Ciffin.

Galesburg, Ill.—Martin Matteson Auto Co., capital stock, \$10,000; incorporators, W. P. Martin, Mrs. W. P. Martin, S. D. Matteson.

Glen Cove, N. Y.—Glen Cove Garage, capital stock, \$1,000; incorporators, T. F. Meade, E. Lewis, L. Lewis.

Gloucester, Mass.—Twin Light Garage Co., capital stock, \$10,000; directors, J. F. Perkins, F. A. Corliss, A. A. Anderson.

Cameron, Lawrence Bailey and Albert D. Ogborn, all of Newcastle.

Detroit, Mich.—J. J. Martin has become a traveling representative of the Commerce Motor Truck Co., which concern is working out a new line of machines which will

be brought out around the first of the year.

Minneapolis, Minn.—C. J. Pettit, manager of the Prest-O-Lite Co.'s New York branch, has been transferred to Minneapolis, where he now has charge of three

Agencies Appointed by Motor Car and Truck Manufacturers

PLEASURE CARS

Town—	Agent	Car	Town—	Agent	Car
Tacoma, Wash.	E. M. Streeter	Cole	Canton, S. D.	A. N. Bragstad	Westcott
Wellsburg, W. Va.	W. J. Hervey	Cole	New York	Richardson-Orr & Co.	Westcott
York, Neb.	Corcoran & Foley	Cole	Columbus, Neb.	Columbus Automobile Co.	Empire
Harrisburg, Pa.	Royal Auto Garage	Pullman	Pompton Plains, N. J.	W. H. May	Empire
Easton, Pa.	Lafayette Motor Car Co.	Pullman	Mokane, Mo.	R. W. Taylor	Empire
Portland, Ore.	Bray-Dubois Auto Co.	Apperson	Pender, Neb.	Silas Lieb	Empire
Los Angeles, Cal.	Benrich Motor Co.	Moline	Mascoutah, Ill.	Schoepp & March	Empire
Providence, R. I.	Providence Auto Co.	Velle	Brighton, Ill.	W. G. Hunt	Empire
Lynn, Mass.	W. W. Whitney & Co.	Cole	Baltimore, Md.	Walter Scott	Premier
Lawrence, Mass.	Jackson Street Garage	Cole	Baltimore, Md.	Shaffer Mfg. Co.	R. C. H.
Fall River, Mass.	F. W. Davis & Co.	Cole	Phoenix, Ariz.	George Hageman	Oakland
Blairsville, Pa.	Blairsville Auto Co.	Lozier	Phoenix, Ariz.	Belt Wilson and Robert T. Jones	Michigan
Columbia, S. C.	Phil D. Kohn	Lozier	Toronto, Can.	Langton Motor Sales Co.	Locomobile
Newark, N. J.	Lozier-Stutz Sales Co.	Lozier	Calgary, Can.	Central Garage & Machine Shop	Cole
Roanoke, Va.	Hunter Motor Co.	Lozier	Cheyenne, Wyo.	Boyle & Joffee	Cole
Uniontown, Pa.	Keystone Automobile Co.	Lozier	Columbia, Mo.	Columbia Automobile Co.	Cole
Tifton, Ga.	H. H. Tift, Jr.	Lozier	Dayton, O.	Cole Sales Co.	Cole
Little Rock, Ark.	H. Tysinger	Lozier	Durham, N. C.	John H. Harris	Cole
Wichita, Kans.	Peru-Van Zandt Implement Co.	Westcott	Edmonton, Can.	International Motor Co.	Cole
Augusta, Ga.	R. J. Edenfield	Westcott	Emerald, Wis.	W. S. Fleming	Cole
Campbellstown, O.	John C. Markey	Westcott	Hempstead, L. I.	W. T. Hutcheson	Cole
Piqua, O.	Gilbert F. Fryling	Westcott	Hillsdale, Mich.	Dr. H. C. Miller	Cole
Brockton, Mass.	William H. Marble Auto Co.	Westcott	Knightstown, Ind.	M. E. Reagan	Cole
Galesburg, Ill.	Galesburg Motor Car Co.	Westcott	Lincoln, Neb.	Joe Simon	Cole
Champaign, Ill.	William H. Miller	Westcott	Lynfield, Mass.	E. M. Elder	Cole
Erie, Pa.	H. Mankel	Westcott	Maitland, Mo.	Rowlett Auto Co.	Cole
Bedford, Ind.	Patterson & Glover	Westcott	Marks, Miss.	J. H. Edwards	Cole
Peoria, Ill.	George J. Smith	Westcott	Martin, Tenn.	G. E. Bowden	Cole
Little Rock, Ark.	Westcott Motor Car Co.	Westcott	McMinnville, Ore.	Younger & Prigmore	Cole
Washington C. H.	Moore & Jamison	Westcott	W. Va.	Colonial Motor Car Co.	Cole
Dayton, O.	Westcott Motor Car Agency	Westcott	Mt. Auburn, Ill.	H. S. Armstrong	Cole
Union Springs, Ala.	Charles W. Tway	Westcott	New Bern, N. C.	H. Evans Sledge	Cole

Announcements

New Concerns Launched in Business World

Houston, Tex.—Cartercar Co., capital stock, \$20,000; incorporators, R. H. Bushway, E. Emmert, C. D. Ferguson.

Huntington, Ind.—Huntington Auto Transit Co., capital stock, \$25,000; to conduct bus line; incorporators, O. E. Bradley, J. M. Hicks, J. W. Caswell, S. A. Stemen, W. W. Hawley.

Indianapolis, Ind.—Auto Lamp & Number Co., capital stock, \$3,000; directors, R. Griffin, A. P. Conklin, R. H. Bruce, W. F. Johnson, G. L. Maas.

Kansas City, Mo.—England Brothers Motor Car Co., capital stock, \$2,000; incorporators, E. England, E. W. England.

Lynn, Mass.—Suffolk Street Garage, capital stock, \$5,000; directors, J. Buckley, D. Lynch, H. Thomas.

Muskogee, Okla.—Pioneer Motor Co., capital stock, \$5,000; incorporators, G. S. Waddell.

New York—Gumprice Motor Truck Co., capital stock, \$1,000,000; to manufacture motor cars and supplies.

New York—American National Motor Bus Co., capital stock, \$1,000,000; to deal in motor buses; incorporators, C. A. Clarke, S. L. Conklin.

New York—Blair Motor Truck Co., capital stock, \$5,000; incorporators, H. O. Lente, F. W. Dix, H. O. Lente.

New York—Hollister Standard Motor Co., capital stock, \$675,000; to conduct motor car business; incorporators, W. H. Langford, L. White, H. H. Sevier.

New York—Queensboro Garage, capital stock, \$10,000; incorporators, F. L. Jockers, A. Jockers, D. J. Stack, A. M. Stack.

New York—Schacht Motor Car Co., capital stock, \$60,000; incorporators, B. Cukor, H. V. Radonitz, C. J. Terrill.

New York—Motor Dealers' Contest Association of New York, capital stock, \$30,000; incorporators, I. M. Uppercu, E. Lascaris, J. C. Nichols.

branches—Minneapolis, St. Paul and Winnipeg.

Chicago.—The Centaur Motor Co., Chicago distributor of the Abbott-Detroit, has secured larger quarters and will shortly take possession of the new prem-

New York—Motor Trading Co., capital stock, \$10,000; to conduct motor car business; incorporators, W. A. Shepard, R. W. Tindall, A. Donces.

New York—Rolaff Oil Carburetor Co., capital stock, \$25,000; to manufacture and sell carburetors; incorporators, R. Wolfsky, J. W. Stone, W. G. Van Vleck.

New York—F. W. Offeldt & Sons, capital stock, \$20,000; to deal in motor trucks; incorporators, E. Y. Eltonhead, E. G. Offeldt, F. A. Offeldt.

New York—United Rubberine Supply Co., capital stock, \$200,000; to deal in tire fillings; incorporators, H. Mayer, T. H. Royce, C. L. Bookheim.

Ottawa, N. Y.—Phoenix Automobile & Truck Co., capital stock, \$50,000; incorporators, J. G. Charrier, S. Borderleau, A. Borderleau, N. DeGrandmont, E. A. Brodeur.

Philadelphia, Pa.—Hindley Gear Co., capital stock, \$10,000.

Philadelphia, Pa.—Auto Safety Signal Lamp Co., capital stock, \$100,000; incorporators, L. Abeles, J. J. Drew, J. G. Gray.

Pontiac, Mich.—Pontiac Motor Castings Co., capital stock, \$8,000; incorporators, W. J. Brown, P. J. Donnelly, T. E. Lyons.

Rochester, N. Y.—Rochester Macandaruba Tire Filler Co., capital stock, \$10,000; incorporators, J. S. Crosier, A. C. Olp.

St. Louis, Mo.—Locomobile Co. of Missouri, capital stock, \$10,000.

St. Louis, Mo.—Black Hawk Motor Co., capital stock, \$150,000.

Waco, Tex.—Waco Auto Supply Co., capital stock, \$5,000; incorporators, W. H. Montz, H. B. Lyne, J. Harrison.

Youngstown, O.—Cartercar Sales Co., capital stock, \$10,000; to deal in motor cars and trucks; incorporators, W. Beight, F. M. Mayberry, C. H. Geiger, F. E. Callor, J. F. Beight.

ises, located at 2246 and 2248 Michigan avenue.

Minneapolis, Minn.—The Dispatch Motor Car Co. has leased new quarters at 511 Fourth avenue S. The company is preparing to begin manufacture in the spring

of a light delivery, as well as a pleasure car line.

Lansing, Mich.—The B. F. Goodrich Co., of Detroit, has increased its capital from \$10,000 to \$500,000.

Des Moines, Ia.—The Riddell Auto Co., of Des Moines, has opened a branch house at Oskaloosa to handle Overlands in that section of the state.

San Francisco, Cal.—A. Armuth has been elected secretary of the Inter-State Co., which is the Pacific factory branch of the Piggins truck.

Pittsfield, Mass.—Edward S. Jacobson, Floyd A. Knight and John J. Whittlesey have formed the J. and B. Co., at Pittsfield, to make ignition and other motor accessory appliances.

London, Ontario.—The Ford Motor Co. has opened a new branch at London. W. H. Smith, who has been with the Ford at Toronto for the last 4 years, has been appointed manager.

Milwaukee, Wis.—The Jonas Automobile Co., representing the Cadillac, has moved into its new home, the Cadillac building, at Eighth and Wells streets, Milwaukee. The former quarters at 417-421 Wells street are now occupied by the Wolleager Auto Sales Co., successor to the Milwaukee branch of the Studebaker Corporation.

Rochester, N. Y.—The United States Tire Co. has opened at 195 East avenue, a subbranch where it will conduct a wholesale business in auto tires and sundries. O. S. Johnson, Buffalo manager for this concern, has been appointed manager of the new branch here with S. N. Keller, to act as local manager. The Rochester branch will include the counties of Monroe, Ontario, Livingston, Schuyler, Chemung, Yates, Steuben and the western half of

Changes Among Dealers Stocking Up for the Season of 1913

PLEASURE CARS

Town—	Agent	Car	Town—	Agent	Car
Newton, Ill.	Newton Motor Car Co.	Cole	Worcester, Mass.	Cashman Auto Co.	Flanders
Pine Bluff, Ark.	Hearn Auto Co.	Cole	Washington, D. C.	Potomac Motor Car Co.	Woods
Prince Albert, Can.	L. Broadfoot & A. J. Manville	Cole	Wilmington, Del.	Gomory-Schwartz Automobile Co.	Ford
Punxsutawney, Pa.	W. L. Simpson	Cole	Carmi, Ill.	John F. Orr	Empire
Regina, Can.	H. A. Gordon	Cole	Cincinnati, O.	Commercial Motor Sales Co.	Empire
Somerville, N. J.	Augustus Duryea	Cole	Des Moines, Ia.	Cartercar Iowa Co.	Empire
Springfield, O.	Valentine King Garage	Cole	Greenville, S. C.	Ellis Car Co.	Empire
St. Paul, Minn.	Motor Truck Co.	Cole	Greentown, Ind.	H. F. Wagner	Empire
Columbus, O.	Murnan Taxicab Co.	Moon	Kansas City, Mo.	England Brothers Motor Co.	Empire
Decatur, Ill.	N. Main Street Garage	Moon	Los Angeles, Cal.	Greer Robbins Co.	Empire
Houston, Tex.	Northrup & Clark Co.	Moon	Memphis, Tenn.	McDonald Automobile Co.	Empire
Los Angeles, Cal.	L. C. Buxton	Moon	St. Louis, Mo.	Johnson Automobile Co.	Empire
Memphis, Tenn.	Chickasaw Motor Car Co.	Moon	Shreveport, La.	C. F. Brown Auto Co.	Empire
Mitchell, S. D.	Central Auto Supply Co.	Moon	Toledo, O.	Crist Motor Sales Co.	Empire
Toledo, O.	Moon Sales Co.	Moon	Wichita, Kans.	Peru Van Zandt Implement Co.	Empire
Washington, Mo.	C. A. Krumsick	Moon	Cleveland, O.	C. J. Reeve	Empire
Wilkes-Barre, Pa.	Thomas W. Haines, Jr.	Moon	Corning, Ia.	Sherman Bradley	Empire
Youngstown, O.	Regal Sales Co.	Moon	Somerset, Pa.	Somerset Automobile Co.	Empire
Phoenix, Ariz.	H. G. Murphy	Little	Carlisle, Pa.	Cumberland Valley Garage	Empire
Phoenix, Ariz.	J. C. Morrison	Hupmobile	Gallion, O.	Gallion Motor Car Co.	Empire
Phoenix, Ariz.	McCondra & Hoeye	Marathon	Quincy, O.	Haines Brothers	Empire
Syracuse, N. Y.	Tweed Brothers	Pope-Hartford	LaCarne, O.	W. S. Woodring	Empire
Portland, Me.	Speare Auto Co.	Flanders			

TRUCKS

Indianapolis, Ind.	Archey-Atkins Co.	Mais	Youngstown, O.	Youngstown Carriage Co.	Federal
Columbus, O.	Coates Motor Co.	Federal	Portsmouth, N. H.	Rockingham Garage & Machine Shop	Federal
Nashville, Tenn.	Cumberland Motor Co.	Federal	Cambridge, Mass.	Blake Auto Co.	Atterbury
Toronto, Ont.	McKinnon Motor Vehicle Co.	Federal	Boston, Mass.	C. B. Johnson Co.	Stewart
Lexington, Ky.	Blue Grass Auto Co.	Federal	Boston, Mass.	C. A. Malley	Flanders
Portland, Ore.	Gerlinger Motor Car Co.	Federal	Detroit, Mich.	Thompson Auto Co.	Standard

Wayne county, including towns on the Northern Central road.

Windsor, Ont.—Russell North has opened a garage and repair shop at 295 Oulette avenue, Windsor.

Detroit, Mich.—It is announced that the Kelsey Wheel Co. will open a branch factory at Memphis, Tenn., for the manufacture of spokes and rims.

Galion, O.—The Cleveland-Galion Motor Truck Co., of Galion, has filed papers with the secretary of state increasing its capital stock from \$300,000 to \$1,000,000.

Winnipeg, Man.—The Breen Motor Co. has closed a contract with the Studebaker Corporation of Canada. It will have exclusive selling rights for Studebaker cars in Manitoba.

San Francisco, Cal.—The W. D. Newerf Rubber Co. has opened a San Francisco service depot at Van Ness and Golden Gate avenues. A supply of Miller tires will be kept on hand.

Dallas, Texas—Replacing Britt Webb, who is now in charge of the Buick at San Antonio, R. C. Langley is acting sales manager for the Buick company at its Dallas branch.

Vancouver, B. C.—The Tudhope Motor Car Co. is putting up a \$50,000 building in Vancouver. It will cover an area of 75 by 125 feet at the corner of Fifteenth avenue and Granville street.

Boston, Mass.—Moses H. Libby, an attorney in Boston, with Roscoe G. Houston and William D. Wallace, have formed the Eliot Motor Car Co., which is capitalized under Massachusetts laws at \$250,000.

Detroit, Mich.—The Detroit Seamless Steel Tubes Co. announces it is again in position to accept orders for its products for shipment after January 1, it having been practically out of business since July 1, owing to a disastrous fire.

Columbus, O.—The announcement is made that the Auto Exchange, at Park and Goodale streets, and the Columbus Auto Inn at Sixth avenue and High street, Columbus, O., have united and located at the latter place. R. C. Shisler and M. E. Bedlack are the managers of the merged concern.

Los Angeles, Cal.—The Los Angeles Alco Motor Sales Co. southern California agent for Alco cars and trucks, has established a branch in San Diego. The new branch will be known as the Alco Motor Sales Co., of San Diego, and is located at 342 Sixth street. W. H. Carlson, Jr., is manager of the branch.

Phoenix, Ariz.—Charles McArthur and George E. Morse have bought the machine shop of the Phoenix Auto Co., which they will conduct under the firm name of McArthur & Morse. They will handle the Case car, for which McArthur holds the local agency. Arthur Ainsworth, former proprietor of the Phoenix Auto Co., retains the Chalmers agency and about January 1 will open a salesroom at 310 North

Central avenue, under the name of the Ainsworth Auto Co.

Dallas, Texas—H. B. Sammons is now assistant manager for the John Deere Plow Co. at the Dallas office.

Seattle, Wash.—The Motor Equipment Co., of Seattle, owned and managed by Edward J. Strelau, has been sold to Ballou & Wright, of Portland.

Victoria, British Columbia.—A new building for the Western Motor and Supply Co. is nearing completion at the corner of Vancouver and View streets, Victoria.

Corning, N. Y.—G. R. Dillon and Max Wolcott have formed a partnership and will conduct a general agency supply and repair business at Tioga avenue garage.

Dallas, Texas—M. C. Wolfe, for several years representing the Columbia, has resigned to become manager for the southwest of the Kisselkar Co. He is now located at Dallas headquarters.

Syracuse, N. Y.—Stewart F. Munroe is now affiliated with the sales department of H. A. Moyer. He was president of the James Auto Co. before that concern was taken by C. Arthur Benjamin, Inc.

New Haven, Conn.—E. J. Bartlett, formerly sales manager of the Stutz Motor Car Co., of Boston, has gone into business for himself and he has opened agencies for the Stutz cars at both New London and New Haven in Connecticut.

Cincinnati, O.—The Commercial Motor Sales Co. has been formed in Cincinnati to handle the Smith truck. G. Schorr is president; W. G. Hoelscher, vice-president and general manager; E. H. Hoescher, secretary, and W. G. Vosler, treasurer. The company has leased a building on Eighth avenue.

Buffalo, N. Y.—Claude M. Nankivel, 17 State street, New York city, has been appointed foreign distributor for Stewart delivery trucks, manufactured by the Stewart Motor Corporation, of Buffalo, N. Y. Mr. Nankivel will handle the sale of these trucks in Europe, Australia, New Zealand, South Africa and South America.

Syracuse, N. Y.—The Jefferson Garage Co., central New York distributor for National and Hupmobile pleasure cars and the International Harvester truck, has opened a new fireproof garage at 428 East Jefferson street, the Freeman block. The garage has the space for the storage of 500 cars. There are four floors and basement, with 40,000 square feet of floor space. Charles J. Roehm is in charge.

Milwaukee, Wis.—It is reported that the United States Tire Co. contemplates the establishment of a direct factory branch in Milwaukee, to serve the state of Wisconsin and possibly some additional territory. The line now is handled by the Goodyear Rubber Co., 382-384 East Water street, Milwaukee, which holds the state territory. Victor M. Stamm is sales manager of the tire department and Edward C. Dusold is traveling state agent. The

report says Mr. Dusold will be made manager of the proposed factory branch here.

Lansing, Mich.—The Everitt-Metzger-Flanders Co. has decreased its capitalization from \$1,000,000 to \$500,000.

Detroit, Mich.—I. M. Jacobson & Sons, 408 Ford building, are operating as a company for the sale of virgin metals, and are manufacturing metal alloys for motor car manufacturers, particularly babbitt metals and all grades of solder.

Sioux City, Ia.—The Motor Mart, the new home of the Bennett Auto Supply Co., agent for Moon cars in Sioux City, was just recently completed. It includes both a service department and a salesroom.

Seattle, Wash.—W. E. Bayless, formerly Seattle manager for the Fisk Rubber Co., has been appointed to succeed the late Tom Rawlins, who died several weeks ago, as manager of the San Francisco branch.

St. Paul, Minn.—Merrit J. Osborne, 15 Ninth street east, will erect a \$50,000 structure at Third street and College avenue. It will be occupied by the White line. The building is to be 91 by 150 feet and will be two stories.

Moline, Ill.—Fred R. Young is building a new garage on Sixth avenue. The building will be of brick, 45 by 150 feet in dimensions, two stories in height, to cost \$20,000. The building will be known as the Plow City garage.

Detroit, Mich.—James W. Cain, formerly acting in the sales department of the McCord Mfg. Co., has been appointed chief engineer of the company, with direct jurisdiction over the engineering, testing and experimental departments.

Indianapolis, Ind.—O. C. Reavell, formerly manager of the sales branch of the Diamond Rubber Co. at Kansas City, has been transferred to the management of the company's Indianapolis branch. He succeeds W. H. Fauvre who has been advanced to manager of the company's Chicago sales and distributing branch.

Chicago.—H. Paulman & Co., handling the Pierce-Arrow, are ready to open their new service building at Twenty-third street and Armour avenue. No selling will be done on the premises. The building contains 26,000 square feet of floor space, has a mammoth elevator, 12 by 30 feet, capable of lifting many tons. The building has unobstructed light on all four sides. Thorough ventilation has been secured. In the repair shop, on the second floor, an unusually high roof enables smoke and gases to be carried away rapidly; the air is fresh and clean even while motors are being tested. The machinery hall's equipment of special machines includes, for instance, a Heald grinder for grinding cylinders. The location of a modern service station at Twenty-third and Armour avenue is considered a great convenience to the motoring public and also to owners of trucks in the downtown district. Twenty-third street is a thoroughfare between Wabash avenue and Halsted

street and Armour avenue is only a few minutes from the loop.

Philadelphia, Pa.—The American Automobile Co., local agent for the American, soon will be housed in a new building at 2116-2118 Market street.

Washington, D. C.—The Diamond and Goodrich tire depots have been removed from 1319 Fourteenth street to larger quarters at 1502 Fourteenth street.

Portland, Ore.—George D. Rushmore has resigned as sales manager for Neate & McCarthy, Portland, and has been succeeded by Harry Twitchell.

Cambridge, Mass.—W. S. Sandeman, proprietor of Sandy's garage, 57 Boylston street, has doubled the floor space of his fireproof building. The garage now has a total floor space of over 7,000 square feet.

Los Angeles, Cal.—Frank G. Miner, southern California distributor of Kelly trucks, has opened headquarters at South Grand avenue, Los Angeles, where the southern Pacific coast distribution will be centralized.

Cleveland, O.—Charles P. Diebold has disposed of his interest in, and has resigned his position as president and general manager of the Diebold-Peters Co. His plans for the immediate future are rather indefinite at the present time.

Middleboro, Mass.—The Middleboro Auto Exchange, New England distributors of the McFarlan six, announces the appointment of L. H. Roberts as director of wholesale sales. Mr. Roberts resigns from a similar position with the Studebaker Boston branch.

Philadelphia, Pa.—The retail selling department of the Studebaker Corporation in Philadelphia has been transferred to the Wallace Automobile Co., which has secured new quarters at the southeast corner of Broad and Callowhill streets. The Wallace company also will maintain a service

station at 206-208-210 North Twenty-first street.

Buffalo, N. Y.—After February 1 the Automobile Sales Co. will move its quarters and service station from 19 Northampton street to 1233-1235 Main street.

San Francisco, Cal.—A direct factory branch of the Federal Rubber Co. has been opened at 361-363 Golden Gate avenue, San Francisco. E. L. Retting will act as wholesale agent and Mohrig Brothers will act as retail distributors in San Francisco.

St. Paul, Minn.—S. W. Wicks is proprietor of the S. W. Wicks Motor Co., 195 West Fifth street, which has succeeded the Co-operative Auto Co. The new company has taken the agency for the Havers.

Los Angeles, Cal.—Progress is being made on the new building that is being built on Flower street, between Tenth and Eleventh streets, by Ralph Hamlin, the Franklin dealer, here. The new structure is a story and a half, with a frontage of 87 feet and is 105 feet in depth.

Milwaukee, Wis.—Roy D. Stewart formerly mechanical manager of the Milwaukee branch of the Thomas B. Jeffery Co., and more recently manager of the Walsh & Schulz garage, has resigned to become Wisconsin traveling representative of the Vacuum Oil Co.

Milwaukee, Wis.—Allen H. Small, assistant manager of the Milwaukee branch of the Buick Motor Co. for some time, has resigned to accept the position of district manager for the Oakland-Wisconsin Motor Co., state agent for the Oakland, Empire and Detroit.

Toronto, Ontario.—The Central Garage and Supply Co., Ltd., 209 King street west, is the Ontario distributor of the Abbott-Detroit and Canadian agent for the Federal trucks. The officers of the company are R. J. Haley, president; P. G. Austin, vice-president; T. S. Blues, treasurer.

urer and general manager, and R. B. Haley, secretary.

Akron, O.—The American Tire and Rubber Co. has increased its capital from \$200,000 to \$500,000. The company has been established only about 7 months.

New York.—W. Krafve has joined the sales force of the H. J. Koehler S. G. Co. as traveling representative for the Koehler commercial car and the Hupmobile.

Sherbrooke, Que.—The Canadian Tire Filler Co., Ltd., has been formed. A large factory and show rooms at Sherbrooke to make this new product have been opened. The company has the sole Canadian right of Day's resilient filler.

Stoughton, Wis.—Oscar & Flon have completed their new garage building on North Water street, but it will not be completely ready until March 1. The building is 46 by 90 feet in size, two stories and basement, with a one-story addition, 26 by 35 feet.

Kentville, Nova Scotia.—The Provincial Motor Car Co., Ltd., is the name of a new company just organized and doing business, with headquarters at Kentville. The capital stock is \$50,000. The agency for the Studebaker Co. has been secured for Nova Scotia for 1913.

Minneapolis, Minn.—G. E. Viehman, head of the Viehman Auto Co., agent for the Auburn Co., has returned to the Northwestern Automobile Co. as sales manager. The Northwestern has given up the Ford line to the new local factory branch and now represents the Krit.

Washington, D. C.—The Commercial Automobile and Supply Co., Studebaker agent, has leased the first floor and basement of the Pope building, formerly occupied by the Pope Automobile Co., and after extensive alterations will take possession about February 1, 1913.

Georgia Rural Financier Points Out What Motor Car Is Doing for the Farmers

SAVANNAH, Ga., Dec. 7—An enterprising rural financier, who once owned a motor car, which he has now sold, has compiled figures tending to show that if all the owners in Georgia would dispose of their cars and put the money in the bank it would afford the banks sufficient funds to loan the farmers to meet a possible financial stringency and move the crops without having recourse to the paternal government to help by loaning money to the banks themselves.

The figures are chiefly interesting as showing what the motor car has done for Georgia. The financier overlooked the hundreds of paved roads that connect the counties in all directions, and afford the farmer an opportunity to move his crops to the railroads at a considerable saving on the wear and tear of his wagons and teams. He overlooked the comparative ease with which farming work is done by motor-driven machinery over the old sys-

tem. He failed to take into consideration the vast amount of business that is done in the cities by means of the motor car.

The advent of the motor car in Georgia has established highways through the mountains to the plains, and it maintains them. It has brought the culture of the city to the country and the products of the ruralist to the town. It has given tired city people an opportunity of enjoying fresh country air and acquainted them with the beauties of nature. It has enabled the farmer to improve his lands and do much work by machinery formerly done by man. It has afforded a more rapid and economical means of transportation for the commercial man. It has increased population in cities and communities. It has built large and handsome buildings and purchased valuable lands. It has brought untold millions in revenue to the people of Georgia. It has given employment to thousands of men throughout the state. It has

made a people healthier and happier by its presence.

Not the least of its accomplishments is the opportunity it has given the people of all communities to see the beauties of their neighboring communities. The motor car, as a vehicle for touring purposes, has the railroads beaten a number of ways. The tourist now, driving his own car, travels at his convenience, stopping wherever the notion strikes him, making a leisurely trip, seeing all that there is to see, getting in touch with the people. A month on the road with a good car is worth a year of travel in dusty trains, where the stopping places must necessarily be the cities.

This is the season of the tourist. They are already turning their motors southward as the frost begins to nip them from behind. Georgia and Florida will be the mecca of these travelers for the next several months.



The Motorist's Kindergarten



EDITOR'S NOTE—Motor Age is publishing in this department a series of non-technical explanations of the various parts of motor cars for the benefit of the reader who knows nothing about them. The subjects will be dealt with in the most elementary manner, so that the series when completed will form a simple elucidation of the car. The first article appeared October 10, 1912.

IT was explained last week that if we have the carburetor arranged to give the correct proportions of air and gasoline when the engine is running slowly we would have too much gasoline in the mixture when the engine is running rapidly.

This gives what is called a rich mixture; that is, it is too rich in gasoline to give the best results. A rich mixture means that there is not enough air provided to burn up all the gasoline, so that the extra gasoline is used without producing any power and comes out at the muffler exhaust as a black, ill-smelling smoke. Some of it sticks in the motor on the pistons,

Carburetor Action (CONTINUED)

and held to its seat by one or more coil springs. The springs are so adjusted that the suction of the engine opens the valve just as the extra air is needed. There is usually an adjustment by which the pressure of the spring can be changed to allow the valve to open more or less, as desired.

Sometimes, instead of the separate float chamber and mixing chamber, the two are combined in order to make the instrument more compact. In this case, the float is in the shape of a ring, like a doughnut, and

The three carburetors illustrated here have the venturi tube air intake.

Spray nozzles are made of several different shapes to break the liquid up into very fine spray. Sometimes a flat plate is placed immediately above the nozzle outlet, so that the liquid hits the plate as it issues from the nozzle and is broken up. In other carburetors, the nozzle is made wider at its opening and a pointed rod extending down from the top of the mixing chamber almost closes the nozzle, leaving a small conical passage between the end of the rod and the nozzle opening. The gasoline is forced to find its way out through this conical opening and is broken up into a fan-shaped spray. This rod can be raised or lowered by an adjusting nut on the top of the carburetor so that the amount of the gasoline that is sprayed out can be regulated.

Another type of nozzle is contracted almost to a pin-point at its opening and through the middle of the nozzle runs a small rod with a conical point just under the small hole in the nozzle. The gasoline passes upward between the rod and the walls of the nozzle, issuing at the end in the form of spray. The rod also provides a gasoline adjustment, for it can be screwed up or down to change the rate of flow.

Some designs of carburetors are provided with two or more nozzles in the same mixing chamber and supplied by the same float valve. These are called multiple-jet carburetors. Usually only two nozzles are used, one of them used alone for low speeds and the other for intermediate speeds, while at high speeds both are in action. The low-speed nozzle is the smaller one and is placed in a small air passage; the other is slightly larger and is located in a larger air tube. The jets are brought into action as they are needed either by automatic valves or by connecting them with the throttle.

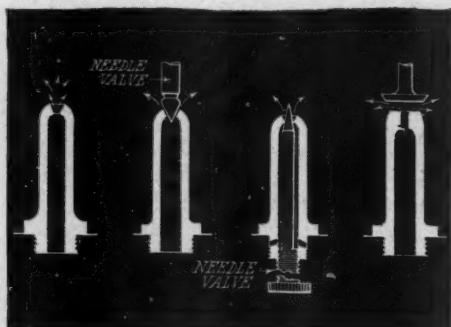


FIG. 12—FOUR FORMS OF GASOLINE SPRAY NOZZLES

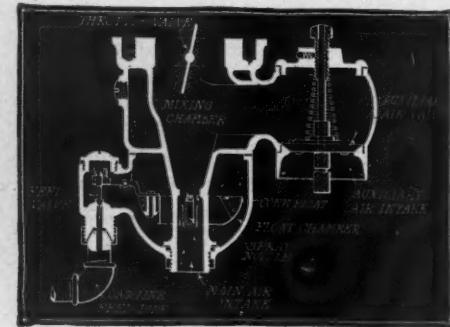


FIG. 13—COMMON TYPE OF CORK FLOAT CARBURETER

cylinders and valves and forms a carbon deposit on them.

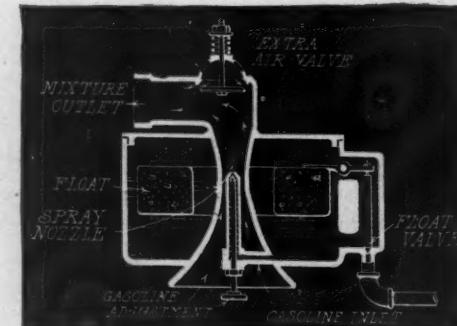
When there is not enough gasoline, too much air, in the mixture it is said to be lean or weak. Such a mixture burns slowly and does not give full power. So it is quite important that the mixture be not too lean at low speeds or too rich at high speeds.

To provide a sufficiently rich mixture at low speeds and to weaken it at high speeds, an arrangement is provided to admit more air as the engine speeds up. This is a valve which is closed when the engine is running slowly, but opens and admits more air into the intake when the engine gets to running so rapidly that it sucks more gasoline out of the spray nozzle than the air from the main air inlet can take care of. Such a valve is called an auxiliary air valve and may be either mechanical or automatic. Mechanical air valves are connected to a governor so that the speed of the engine directly determines their opening. They are little used in motor cars.

By far the most general type of auxiliary air valve is the automatic air valve, like that shown in Figs. 13, 14 and 15. This is simply a flat valve opening inwards

the spray nozzle and air tube go right up through the center with the mixing chamber above. With this type of float, the float valve is over to one side of the float chamber and is connected with the float through a small lever. An arrangement of this sort is used in the Schebler carburetor illustrated in Fig. 13.

It has been found that if the main air intake has somewhat the shape of an hour-glass, wide at the bottom opening, with its narrowest part at the spray nozzle, and widening again at the mixing chamber, the gasoline is sucked up better by the air and a better mixture is obtained. This shape of inlet is called the venturi tube.



FIGS. 14 AND 15—TYPES OF SPRAY NOZZLES AND NEEDLE VALVES FOR CARBURETERS

